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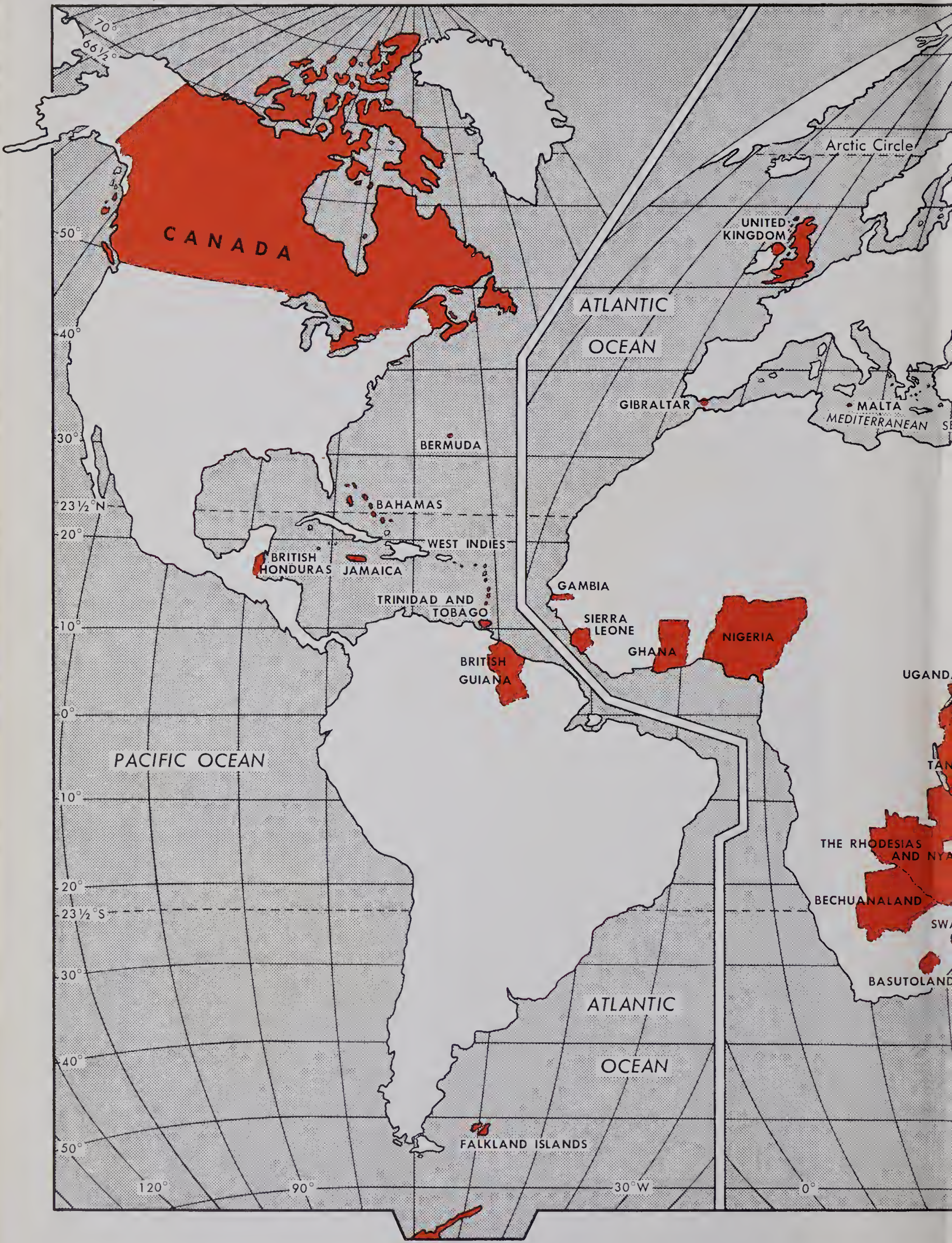
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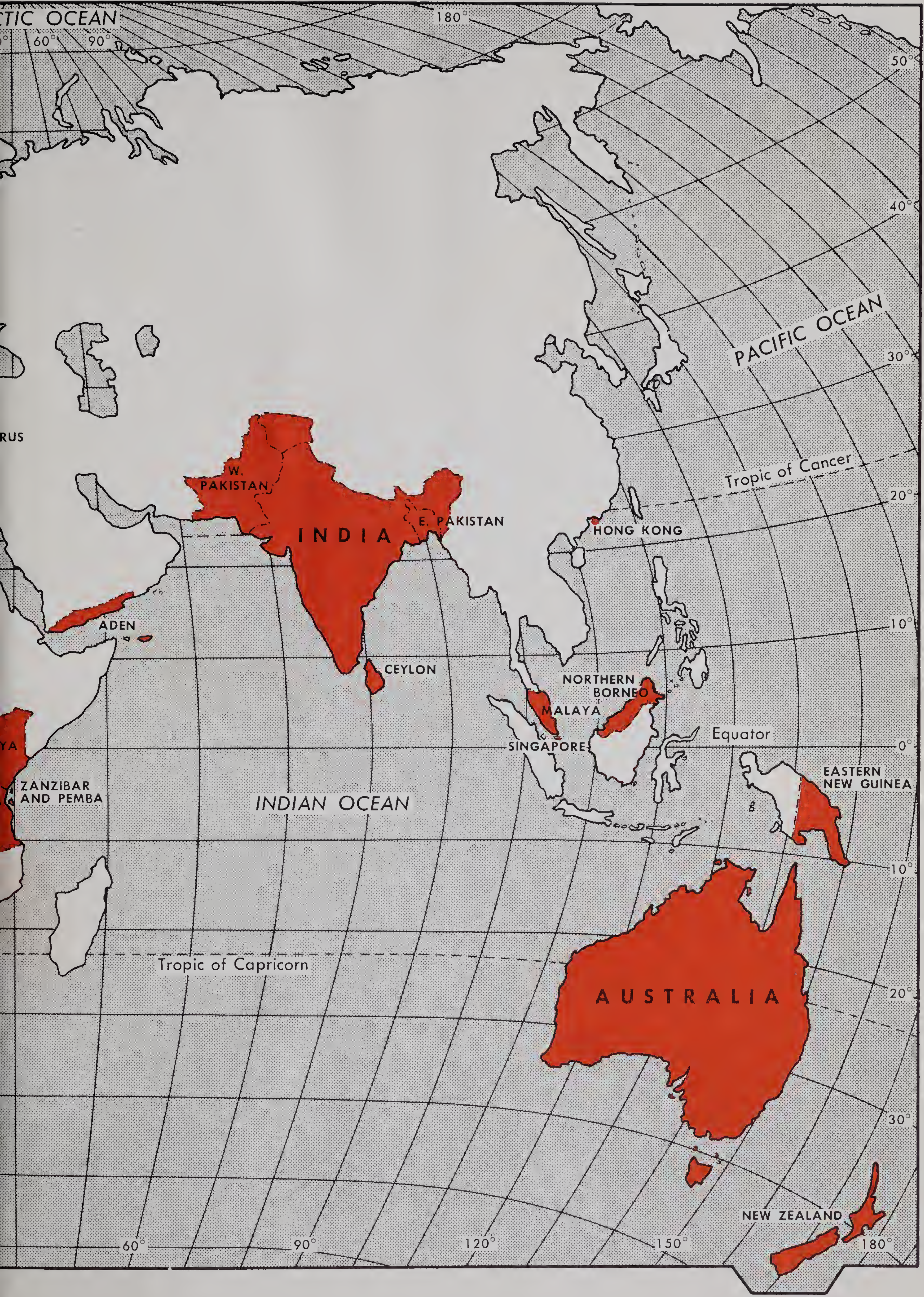
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THE
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Education
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Appreciation is also extended to Mrs. Mabel E. Fells and to Miss Ada Sparling who provided the photographs used on the cover.

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A
CANADIAN
TEXT BOOK
by
McGRAW-HILL CANADA

Preface

This book was written especially for use in Canadian schools. Items of special interest to Canadians are stressed, and comparisons to things Canadian are numerous. Wherever possible, the text demonstrates the relationships that exist between Canada and the part of the Commonwealth being studied.

The authors have attempted to present their material in a concise, logical way and at an appropriate reading level. In selecting topics and information from the abundance of available material, two basic principles have been observed: (1) although a topic may be of importance in several areas, it receives detailed consideration only within the area where it is most significant; (2) the important factors of each region's economy and the effects of these factors upon the people of the regions have been stressed.

The predominant economic activities of each region are discussed, but actual production methods are not described unless the final product represents a major source of income to the inhabitants, or unless the total production is a significant fraction of the world's supply.

A similar restraint has been adopted in the treatment of physical features; such factors as climate, soils, flora, and fauna are described only when they are of considerable importance, and when their introduction does not impair the clarity of the regional description.

The authors have included several features which will be appreciated by classroom teachers. With few exceptions, each map has a single purpose so that the student is not confused or discouraged by a cluttered mass of detail. Pictures have been chosen to illustrate topics which a Canadian student might find difficult to understand without some visual supplement. All captions to the illustrative material are intended to teach, not just to identify. Each regional discussion is followed by a conclusion in order to help the student evaluate the region in relation to the rest of the modern world. Work units have been introduced at selected points through-

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out the book to suggest an approach to supplementary work related to the section. In many sections, a "problems" unit has been inserted to expand upon any matters that constitute a major problem to the people concerned. Also included are Review Quiz exercises that should help the student to assess his understanding of the work that he has covered.

Statistical information and specific facts are included to avoid vague generalizations and to give the student a clear concept of quantity. No thought that junior students should be expected to memorize any but the most significant facts and figures is intended by the authors.

Unity of style and presentation has been maintained throughout the book by the authors' division of labour. Mr. Kostek acted as supervisor and contributed valuable material to the Work Units and the Review Quiz sections. Mr. Braund wrote the manuscript, while Mr. Woods did research and map work.

Sincere thanks are extended to the many individuals and organizations that provided information and illustrations for use in this book. Their willing cooperation and their concern for the enlightenment of Canadian students are much appreciated.

THE AUTHORS

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The Modern Commonwealth

The Commonwealth of Nations is a free association of independent states together with the dependencies of the United Kingdom. All of the independent members have two things in common. They were once controlled by Britain, and they now all regard the Queen of the United Kingdom as the head of the Commonwealth. Together, these countries cover more than one-quarter of the world's land surface and contain one-quarter of the world's population. More than 700 million people live in this large family of nations, which occupies more than 14 million square miles of land. The exact locations, areas, and populations of the independent member nations are shown on the Commonwealth map and in the accompanying statistical table.

THE INDEPENDENT MEMBERS OF THE COMMONWEALTH

Country	Population	Area (sq. mi.)	Population Density	Per-Capita Income* (in Canadian dollars)
India	436,425,000	1,260,000	346	$ 75
Pakistan	93,690,000	365,500	256	$ 62
United Kingdom	54,096,000	94,000	575	$1180
Nigeria	35,752,000	356,670	100	$ 110
Canada	18,200,000	3,851,800	5	$1580
Australia	10,508,000	2,974,581	3½	$1430
Ceylon	9,905,000	25,300	391	$ 145
Tanganyika	9,403,000	362,700	25	$ 65
Malaya	7,017,000	53,464	131	$ 220
Ghana	6,690,000	92,100	72	$ 325
Uganda	6,682,000	93,981	71	$ 80
Sierra Leone	2,680,000	28,000	95	$ 75
New Zealand	2,500,000	103,740	23½	$1400
Jamaica	1,700,000	4,411	385	$ 345
Trinidad-Tobago	828,000	1,980	418	$ 515
Cyprus	563,000	3,572	157	$ 360

*Obtained by dividing the population into the total national income.

Figure 1. Her Majesty Queen Elizabeth visits Australia's "Outback". *Children such as these welcomed the Queen as she toured the Australian "Outback" between Alice Springs and Darwin. This tour was part of the recent Royal visit to Fiji, New Zealand, and Australia, one of many such visits that the Royal Family makes to Commonwealth countries around the world.*

PEOPLES OF THE COMMONWEALTH

People of many races and colours live in the Commonwealth. All of the three great racial groups — Caucasian, Negroid, and Mongoloid — are well represented. Aryans, who are members of the Caucasian group, are the major peoples of the United Kingdom, Cyprus, Canada, Australia, New Zealand, Pakistan, and northern India. Although the Aryans are all members of the so-called "white" race, the peoples of Pakistan and northern India have much darker skins than most Canadians. Very dark-skinned peoples, who are members of the Negroid race, form the majority groups in southern India, Ceylon, Africa, and the West Indies. Most of the inhabitants of Malaya, Singapore, and North Borneo are either Malays or Chinese, both of which belong to the Mongoloid group. Smaller groups of Chinese occur in the West Indies, on the west coast of Canada, and in other scattered parts of the Commonwealth. Canada's Indians and Eskimos are also members of the Mongoloid race. In isolated areas throughout the Commonwealth, there are pockets of native people who are descended from the original inhabitants of the countries. Typical of these peoples are the Aborigines of Australia, the Maoris of New Zealand, the Indians and Eskimos of Canada, and the primitive tribal groups of Asia and Africa. The variety of peoples found in the Commonwealth makes it the greatest multi-racial association the world has ever known. *Fig. 1*

Density of Population The great host of people living in the Commonwealth is not evenly distributed across its surface. In some areas, like England and East Pakistan, people are very crowded. In other lands, like Canada and Australia, people have plenty of space for settlement. The term "density of population" refers to the number of persons that live in a square mile of a particular place. This number is obtained by dividing the area of the place into its population. The figures obtained when this is done for each independent country of the Commonwealth are shown in the accompanying statistical table. *p. 1*

MAJOR PRODUCTS OF THE COMMONWEALTH

Food Foods of many types are produced in great quantities in the Commonwealth. The types of food crops depend upon local growing conditions and upon the eating habits of the people. Food is a principal item in the foreign trade of most Commonwealth members, both as exports and as imports.

Rice is the main food of almost half the human race. It is the principal crop of overcrowded Asia, because an acre of rice produces more food than almost any other crop. Rice is a leading crop in India, Pakistan, Ceylon, and Malaya, although these countries must buy additional supplies to meet the needs of their vast populations.

Wheat is a better source of energy than rice. It is the principal food in countries populated by people of European origin. Canada is the outstanding producer of wheat in the Commonwealth. Other important producers are India, Australia, Pakistan, and the United Kingdom.

Corn is a major item in the diet of the native peoples of the countries of east and central Africa. It is also an important crop in parts of India.

In the dry areas of West Pakistan and northern India, millet and sorghum are the principal foods of many millions of people. These foods are also grown and used in west Africa. Rye, barley, and oats are important crops in Canada and the United Kingdom, and considerable amounts of barley are also grown in India. Unlike wheat, these grains are used mainly for feeding livestock rather than for making bread.

Potatoes are an important item in the diet of the people of the United Kingdom, Canada, Australia, and New Zealand. The sweet potato and the yam are grown widely in the tropical countries of Africa and in southeast Asia.

Meat is a luxury for the majority of the people of the Commonwealth. Only the peoples of the United Kingdom, Canada, Australia, and New Zealand eat a great deal of meat. Commonwealth pastures support many millions of cattle and sheep. Pigs and poultry are found in practically every part of the Commonwealth. New Zealand, Australia, Canada, and the United Kingdom produce large quantities of dairy products.

Vegetable oils take the place of animal fats as a food in many parts of the world. Even in mid-latitude countries like Canada and Great Britain, margarine and other fats of vegetable origin have become popular foods. The Commonwealth crops that produce vegetable oils include peanuts and sesame in India, oil palms in Nigeria, and coconuts in Ceylon and Malaya.

India, Australia, and the West Indies produce large crops of sugar cane. About half of the world's tea is grown on plantations in India, Pakistan, and Ceylon. A much smaller amount of coffee is produced in East Africa and southern India. Ghana and Nigeria together produce about half the world's suppy of cocoa.

Fruits are grown in almost every part of the Commonwealth. Local growing conditions, of course, determine the types that are produced. Apples, pears, peaches, and apricots thrive in all the mid-latitude countries. Australia and Cyprus are major producers of grapes and the wine and dried fruits that are made from them. Oranges, lemons, grapefruit, and other citrus fruits are important crops in the West Indies, Cyprus, and Australia. Malaya grows many pineapples, and bananas thrive in Nigeria and Jamaica.

Industrial Fuels and Raw Materials Major coalfields are found in Great Britain, Canada, India, and Australia. In recent times, Canada has become a significant world producer of petroleum, and smaller amounts of oil are produced in Borneo, Trinidad, West Pakistan, and northern India. Canada and Australia provide the Commonwealth with a good supply of uranium, a basic requirement in the production of atomic energy.

Canada, India, and Australia have large reserves of iron ore. Other important mineral deposits of the Commonwealth include manganese in Ghana and India; cobalt in Northern Rhodesia and Canada; nickel in Canada (over three-quarters of the world's supply); titanium in Canada, India, and Malaya; bauxite in Jamaica, British Guiana, Malaya, Australia, Ghana, and India; copper in Northern Rhodesia, Canada, India, Australia, and Cyprus; tin in Malaya (one-third of the world's supply) and Nigeria; lead and zinc in Australia and Canada; gold in Canada, Australia, Southern Rhodesia, and Ghana; silver in Canada and Australia; platinum in Canada; asbestos in Canada, Cyprus, and Southern Rhodesia; and mica in India. How are each of these minerals used by man?

The Commonwealth also produces a great variety of industrial materials which are of animal and vegetable origin. A few of the more significant ones are wool in Australia (one-quarter of the world's supply), New Zealand, and the United Kingdom; hides and skins in Africa, New Zealand and Australia, and India; cotton in India, Pakistan, Africa, and Cyprus; rubber in Malaya, Borneo, and Ceylon; and wood products in Canada, Tanganyika, India, and Australia. Canada alone produces almost half of the Commonwealth's supply of sawn timber and is a major exporter of lumber, newsprint, pulpwood, and paper.

GENERAL GEOGRAPHY

The study of geography shows us how the forces of nature influence man's way of living and how man attempts to adjust to the natural conditions around him. Thus a knowledge of geography can help us to improve our own standard of living and can guide us in helping people in less fortunate areas to improve theirs. In other words, the study of geography enables us to understand and to solve the problems created by the natural conditions around us.

Geography deals with natural conditions such as climate, soils, and vegetation so that we can understand man's use of forests, grasslands, deserts, and water. It considers man's performance of his everyday tasks in forestry, farming, fishing, manufacturing, and other economic activities. It also examines man's characteristics, such as race, colour, education, health, customs, and religion, which are strongly influenced by his geographical location. Many specific things are also learned by studying geography: such things as why so many Ghanaians depend on cocoa for their livelihood, why many Nigerian homes are made of mud, why there are so few wooden homes in India, and why most Australians have no snow at Christmas time.

OUR PLANET, EARTH

The earth is a planet, which is a heavenly body that has no light of its own but merely reflects the light of a star. The earth constantly revolves round the sun, following a fixed path called an orbit. Also travelling in orbits around the sun are (a) eight other planets and their satellites, (b) several hundred small planets, called asteroids, and (c) a few comets. As a star, the sun shines by its own light. Considered as a unit, these heavenly bodies make up the Solar System, only one of a vast number of planetary systems in the universe.

The planets in order of their distance from the sun are Mercury (the closest), Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. Revolving around several of the planets are

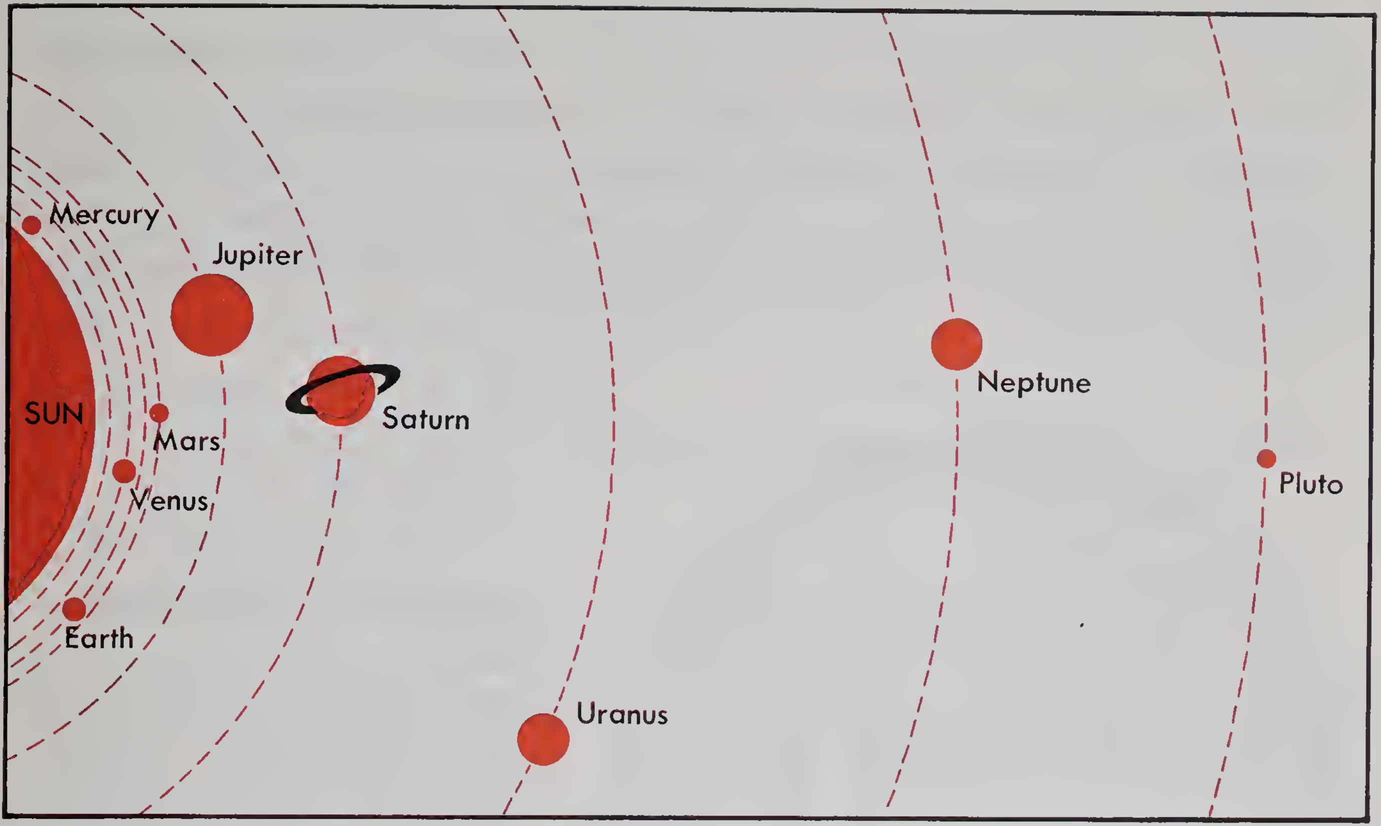


Figure 2. The Solar System.
On a diagram of this size, it is impossible to draw the Solar System to the correct scale. However, an attempt has been made to show the relative size of the planets and to indicate the varying distances between them.

satellites or moons. Earth has only one moon, but Jupiter has twelve, Saturn nine, Uranus five, and Neptune and Mars two each. Mercury, Venus, and Pluto have no satellites. The Earth with its 7,900 mile radius and 24,900 mile circumference seems large to us. But it is very small in comparison with the sun and the larger planets. Jupiter, for example, is ten times larger than the Earth, and the sun is many times larger than Jupiter.

The Earth is roughly spherical in shape. However, it is slightly flattened in the polar regions, and it bulges slightly near the equator.

LATITUDE AND LONGITUDE

Most city planners use the system of streets and avenues to pinpoint addresses. In order to pinpoint places on the surface of the earth, geographers use a system of imaginary lines called "parallels of latitude" and "meridians of longitude". We may think of these as the streets and avenues of the world.

As you examine the diagram below, you will notice that latitude lines are drawn parallel to the equator, which is the imaginary line dividing the Northern and Southern hemispheres.

Notice that these parallels of latitude are either South of the equator or North of the equator. Remember that latitude is the distance North or South of the equator. It is measured in degrees.

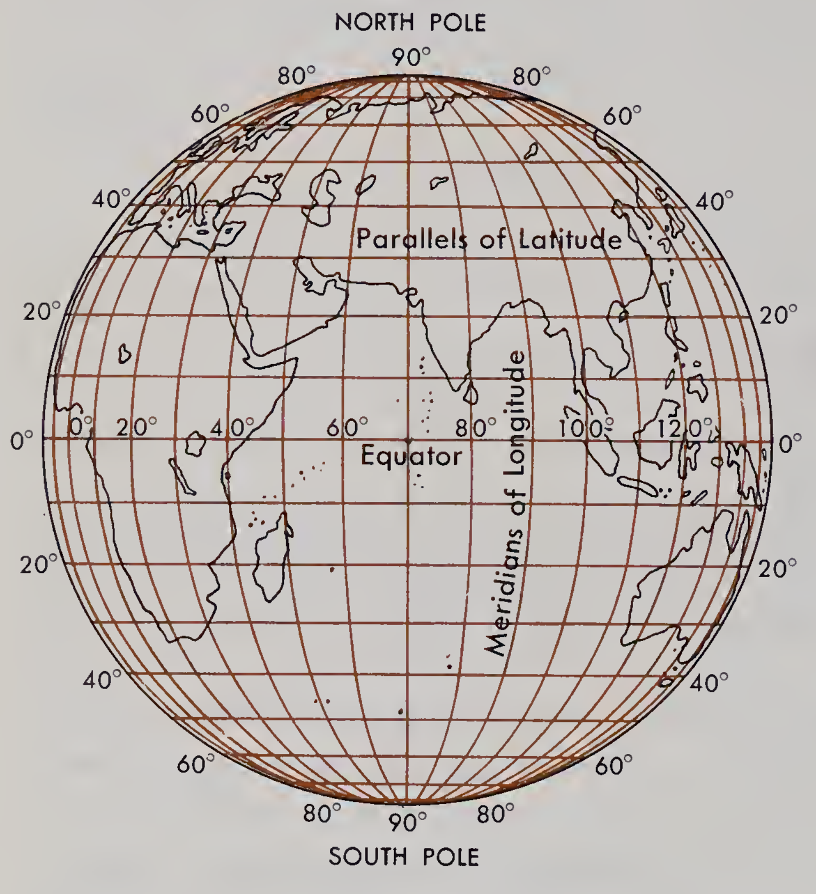

NORTH POLE
90°
80°
80°
60°
60°
40°
40°
Parallels of Latitude
20°
20°
0°
0°
20°
40°
60°
80°
100°
120°
Equator
Meridians of Longitude
0°
20°
20°
40°
40°
60°
60°
80°
90°
80°
SOUTH POLE

Figure 3. The Earth's Grid.
The lines of "Latitude and Longitude" when drawn on a globe, form a grid which divides the globe into small, numbered sections.

One degree of latitude is equal to about 69 miles. We can prove this by dividing the number of degrees in the circumference of the earth into the number of miles in the earth's circumference. One degree of latitude, then, is equal to $\frac{24{,}900 \text{ mi.}}{360 \text{ degrees}} = 69.2$ miles.

The distance between the equator and the North Pole is one-quarter of the distance around the earth. This distance is equal to one-quarter of 360 degrees, or 90 degrees. Latitude is measured in degrees North and South of the equator. Ninety degrees North is the North Pole. Ninety degrees South is the South Pole. If you locate Ottawa on your globe, you will notice that it is half way between the equator and the North Pole. Its latitude, therefore, is 45 degrees North.

Longitude is measured from an imaginary line, too. It is measured East and West from the Prime Meridian which passes through the world-famous observatory at Greenwich, a suburb of London, England. Longitude is measured in degrees as is latitude. But one degree of longitude is equal to 69 miles only at the Equator. Why is this so?

At 70 degrees North, one degree of longitude is equal to about 23 miles. At 80 degrees North, it is only 12 miles. What is it at 90 degrees North?

Remember that longitude is measured East and West of the Prime Meridian: 180 degrees West longitude is the same as 180 degrees East longitude. This particular meridian is called the International Date Line. It runs through the central part of the Pacific Ocean. Locate it on your globe.

In summary, then, remember these facts about locating places on the earth.

1. Parallels of latitude and meridians of longitude are used to pinpoint places on our earth. They are the "streets and avenues of the world."

2. Latitude is measured in degrees (from 1 to 90 degrees) North or South of the equator.

Longitude is measured in degrees (from 1 to 180) East or West of the Prime Meridian.

EARTH MOVEMENTS AND THEIR RESULTS

Our planet moves in two ways: (1) It *revolves* round the sun once every 365¼ days; the roughly circular path the earth follows round the sun is called its orbit, and (2) it *rotates* or spins on its imaginary axis once every twenty-four hours. Its axis is always tilted 23½ ° from the vertical. As the earth travels in its orbit, it spins on its axis. Remember that as it spins and revolves, its axis is always tilted in the same direction. The North Pole is turned away from the sun for part of the yearly journey and toward the sun for part. The tilting and spinning of the earth on its yearly *Fig. 4* journey around the sun have very important effects upon our planet.

Three important effects result from the combination of the revolution of the earth around the sun and the tilt of the earth's axis to the plane of the earth's orbit. These effects are (1) the changing seasons, (2) the varying length of day and night, and (3) the fixing of locations for the Tropics of Cancer and Capricorn, and the Arctic and Antarctic Circles.

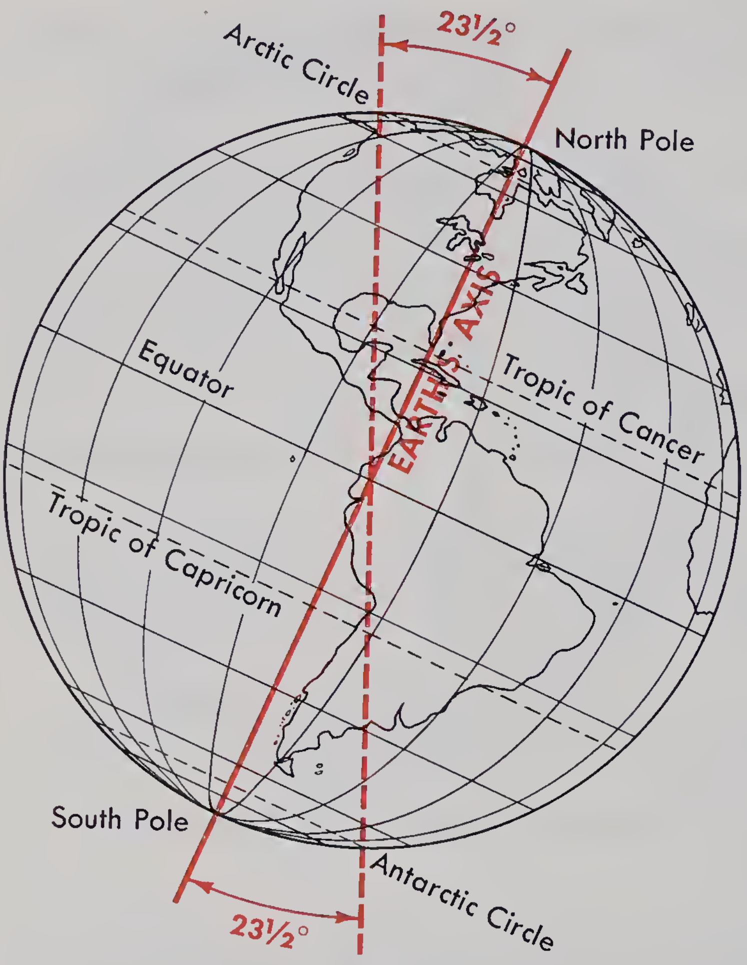
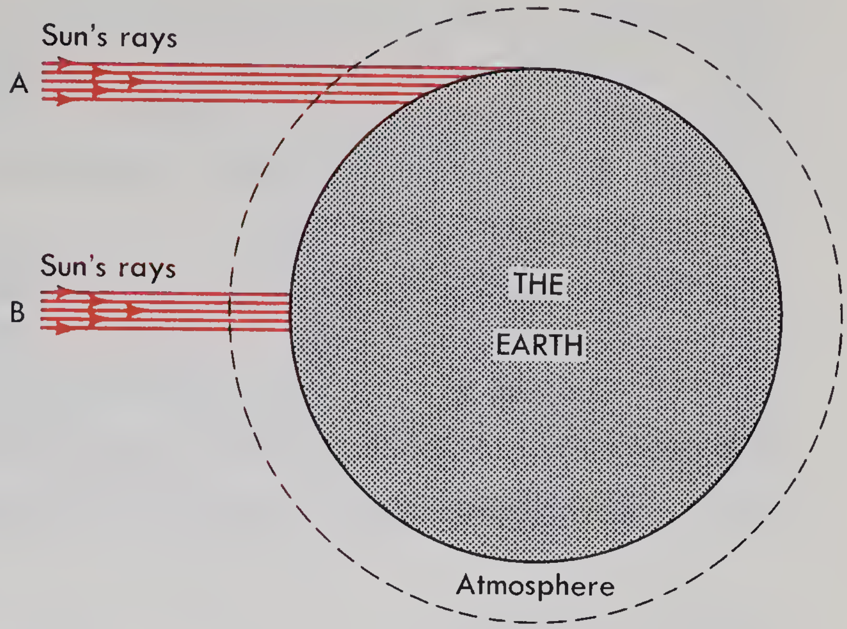


Figure 4. The Inclination of the Earth's Axis. *The dotted line represents a line drawn perpendicular to the plane formed by the earth's orbit. The solid line represents the earth's axis, which passes through both poles. Note that (1) the axis of the earth is inclined 23½ degrees from the perpendicular, (2) the perpendicular passes through the Arctic and Antarctic Circles, and (3) the Tropics of Cancer and Capricorn are 23½ degrees from the equator.*

The Seasons The direct rays of the sun have a stronger heating effect than do those which strike the earth at an angle *Fig. 5* (see accompanying diagram). As a consequence, the warmth of any part of the earth depends upon the angle at which the sun's rays strike it. Because of the tilt of the earth's axis, the angle at which the sun's rays strike any particular spot on the earth's surface changes as the earth revolves around the sun. In March and September, the sun is overhead at the equator. In June, it is overhead at the Tropic of Cancer in the northern hemisphere, and

Figure 5. Direct Rays of the Sun Heat Better Than Oblique Rays.
The direct rays "B" bring more heat to the earth's surface than the oblique rays "A" because (1) the direct rays are concentrated in a much smaller surface area, and (2) they pass through less atmosphere.


Sun's rays
A
Sun's rays
B
THE EARTH
Atmosphere

in December it is overhead at the Tropic of Capricorn in the southern hemisphere. It is these apparent movements of the overhead sun and the resulting changes in the angle at which the sun's rays strike the earth that cause our seasons. For example, when

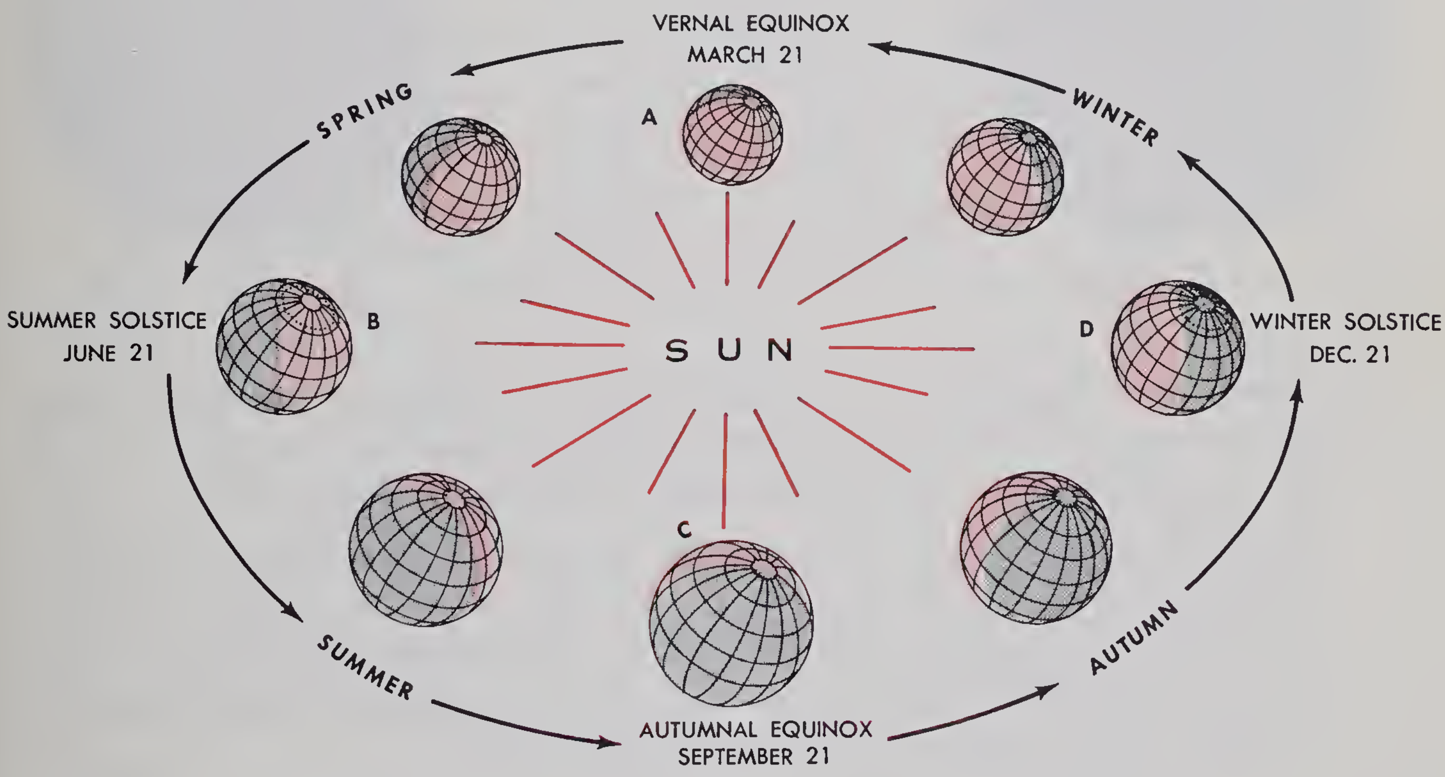

VERNAL EQUINOX
MARCH 21
A
WINTER
SPRING
SUMMER SOLSTICE
JUNE 21
B
SUN
D
WINTER SOLSTICE
DEC. 21
C
SUMMER
AUTUMN
AUTUMNAL EQUINOX
SEPTEMBER 21

Figure 6. The Seasons.
At positions A and C, the direct rays of the sun are striking the earth at the equator. At position B the direct rays are striking the Tropic of Cancer, and at position D they are striking the Tropic of Capricorn. Why do the sun's direct rays move to these various positions?

the northern hemisphere, containing Canada, is tilted towards the sun, it receives the most direct rays and the greatest amount of heat, and so it experiences summer. When it is tilted away from the sun, it receives less-direct rays and a smaller amount of heat, and so it experiences winter.

Varying Lengths of Day and Night The variation in the lengths of day and night according to the seasons is also caused by the revolution of the earth round the sun and the inclination of the earth's axis. So are the long periods of continuous day and night experienced in Canada's polar regions.

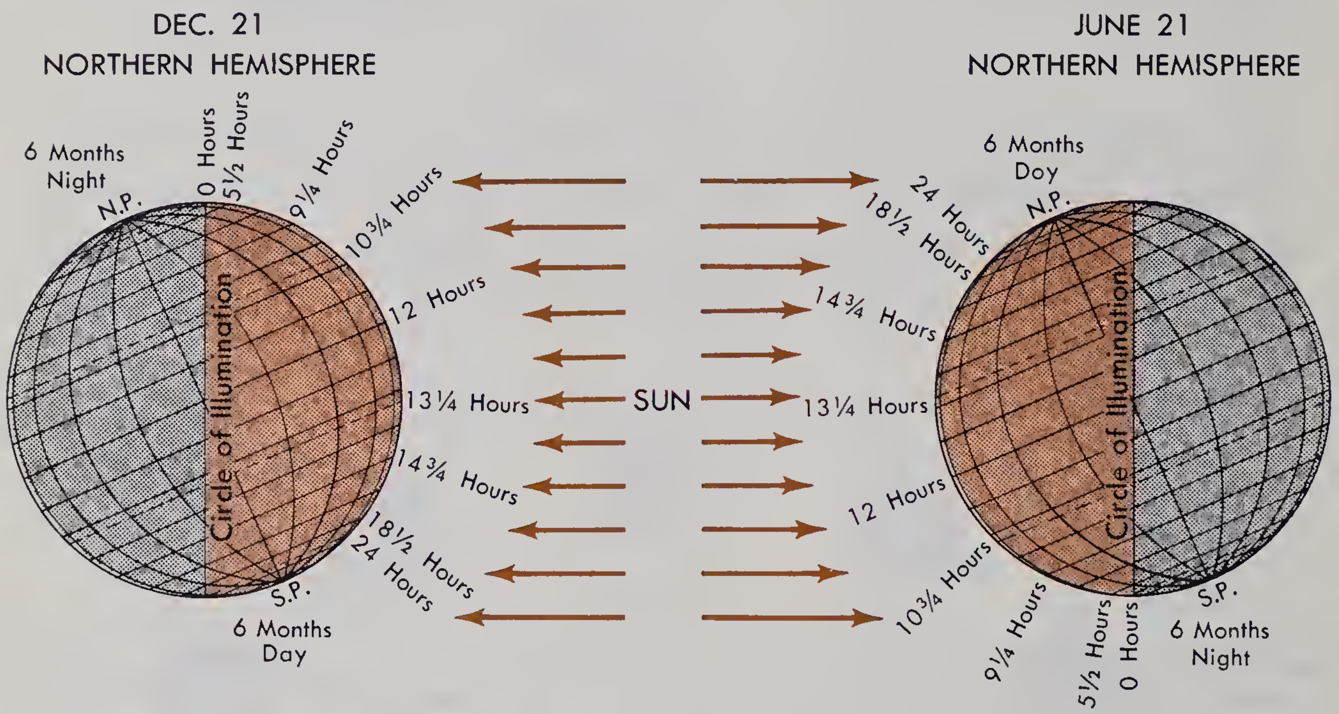

DEC. 21
NORTHERN HEMISPHERE
6 Months Night
N.P.
0 Hours
5½ Hours
9¼ Hours
10¾ Hours
12 Hours
13¼ Hours
14¾ Hours
18½ Hours
24 Hours
S.P.
6 Months Day
Circle of Illumination
SUN
JUNE 21
NORTHERN HEMISPHERE
6 Months Day
N.P.
24 Hours
18½ Hours
14¾ Hours
13¼ Hours
12 Hours
10¾ Hours
9¼ Hours
5½ Hours
0 Hours
S.P.
6 Months Night
Circle of Illumination

Figure 7. Diagram to Show the Varying Lengths of Day and Night. *The lighted half of the earth shifts north and south because of (i) the tilt of the earth's axis and (ii) the earth's* revolution *around the sun. As a result, the length of day varies north and south, the amount of variation depending upon the season and the distance north or south. The polar regions cannot* rotate *out of the lighted area during the summer, or out of the dark area in winter, thus causing long periods of continuous day or night within the Arctic and Antarctic Circles.*

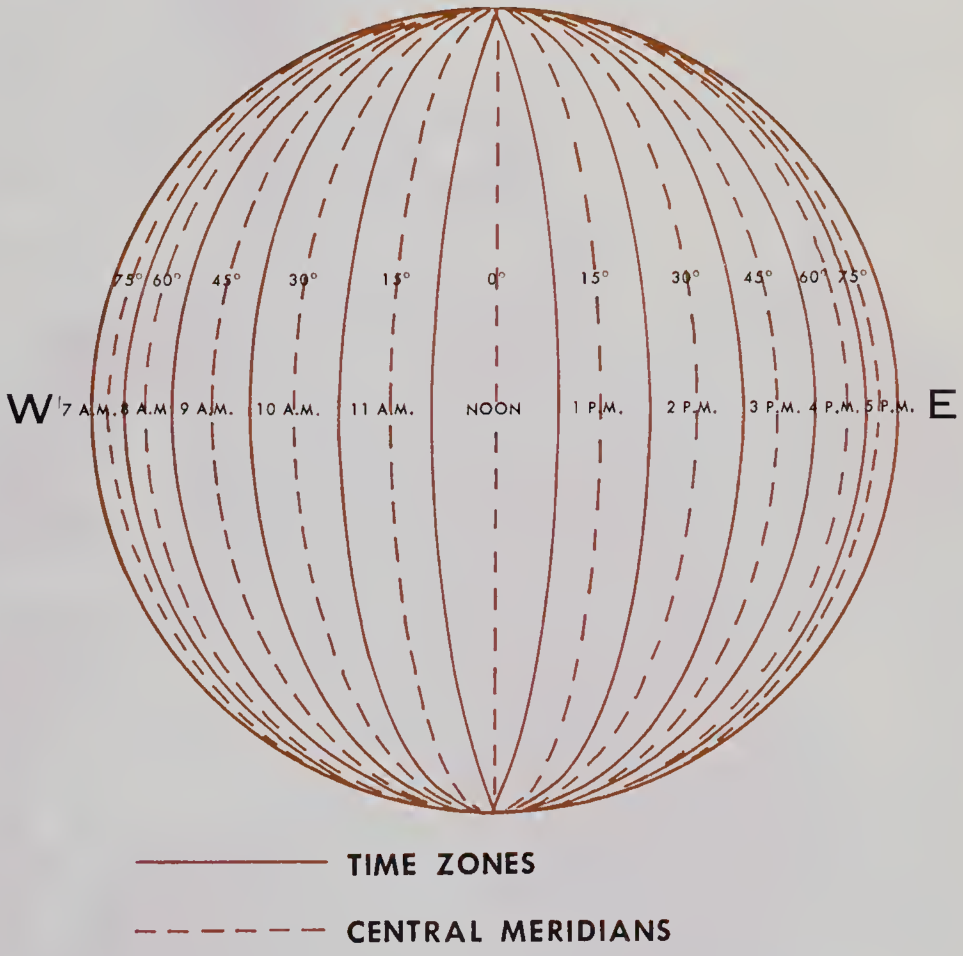
Location of the Tropics The positions of the Tropics of Cancer and Capricorn are determined by the apparent movement of the sun north and south with the seasons. The word "apparent" is used because the sun does not move around the earth. Throughout the year, the sun is directly overhead at noon at some point between 23½ °N. and 23½ °S. We call the 23½ °N. parallel of latitude the Tropic of Cancer. The 23½ °S. parallel is called *Fig. 4* the Tropic of Capricorn.

The location of the Arctic Circle is also determined by the apparent movement of the sun. It represents the southern limit of the area which experiences at least one day of continuous light and one day of complete darkness during the year. A similar area is bordered by the Antarctic Circle at the southern section of the globe.

LONGITUDE AND TIME

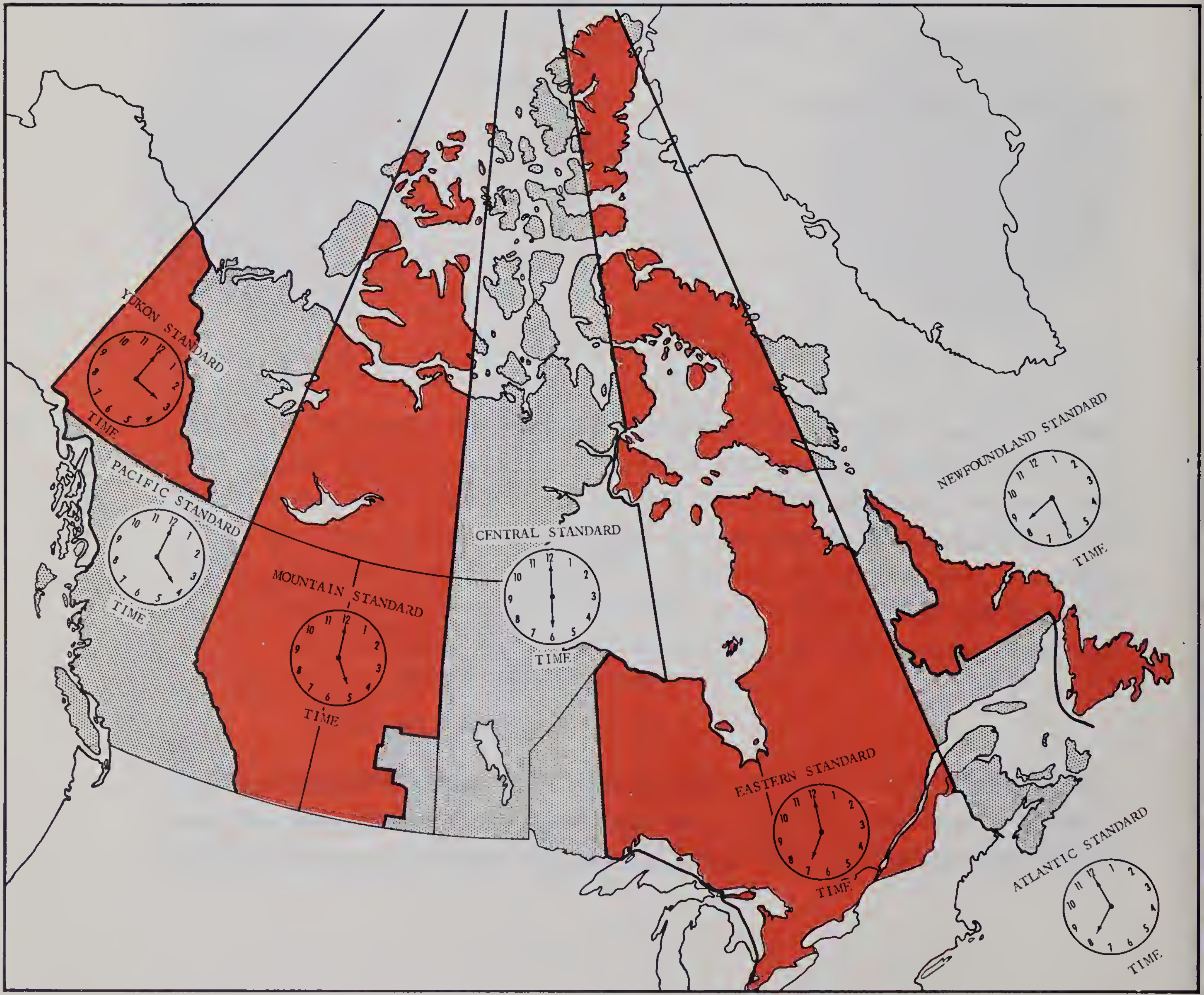
Noon arrives at the same time for all places on the same line of longitude. Thus lines of longitude are called meridians, the term "meridian" coming from the Latin word "meridies" which means "midday". The sun cannot be directly overhead at more than one meridian at a time. Therefore, the time at which noon

Figure 8. Longitude and Time.
Time varies from east to west according to longitude, and all places within a time zone use the sun time of its central meridian. According to the diagram, (1) how many degrees wide is each time belt, (2) does time move forward or backward as one travels eastward, and (3) what is the central meridian of the time zone in which you live?



arrives must vary from place to place. Remember, too, that the earth rotates in an eastward direction. For this reason, places towards the east receive the light of the sun before places towards the west. This is why time varies from east to west on the surface of the globe. There is a difference of four minutes between the local, or sun, time at one meridian and the local time at the meridian on either side of it. The meridian to the east is four minutes ahead and the meridan to the west is four minutes behind. The
Figs. 8 & 9 diagram will help you to understand time.

Figure 9. Canada's Time Zones.
Canada is divided into seven time zones as shown here. Which province has time that varies only ½ hour from the time belt to the west of it? What is the name of the time zone in which you live?


YUKON STANDARD TIME
PACIFIC STANDARD TIME
MOUNTAIN STANDARD TIME
CENTRAL STANDARD TIME
EASTERN STANDARD TIME
NEWFOUNDLAND STANDARD TIME
ATLANTIC STANDARD TIME

Time Belts: There would be much confusion if every community kept its own time according to the sun. For this reason, the globe is divided into Standard Time Belts throughout which the time is considered to be the same. Each time belt is approximately 15° in width. Every place in the 15° belt has the same time. Edmonton and Calgary are in the same time belt and have the same time. Winnipeg and Vancouver are in time belts on either side of the one in which Edmonton is located. When it is 12 noon in Edmonton, it is 11 o'clock in Vancouver and 1 o'clock in Winnipeg.

The world is divided into 24 time zones. Canada is divided into seven time zones: Newfoundland, Atlantic, Eastern, Central, Mountain, Pacific, and Yukon. The difference in time in the various zones is shown on the clock faces on the map. Newfoundland school children are well into afternoon classes when Alberta children arrive for 9 o'clock classes.

The International Date Line A strange situation exists at the meridian 180°. Each new day begins at this line of longitude. The day then proceeds westward round the world, and it takes the day a full 24-hour period to reach 180° again from its eastern side. Thus, time in the area immediately to the west of 180° meridian is always a full day ahead of time in the area on the eastern side of the meridian, (although the *hour* of the day is the same). For example, when it is 11 A.M. on *Monday* just west of the 180° meridian, it is 11 A.M. on *Sunday* just east of the 180° meridian. This means that a ship crossing the 180° meridian, or International Date Line, in an eastward direction gains a full day; while a ship crossing the Date Line in a westerly direction loses a day. If a ship crossed the Date Line going east at 8 P.M. on Tuesday, December 25th (after a delightful Christmas Day at sea), it would immediately become 8 P.M. on Monday, December 24th (or Christmas Eve, with all the delights of Christmas Day to come). However, had the ship been travelling westward, most of Christmas Day would be missed or lost. Why? Find the International Date Line in your atlas. Why does it follow a zig-zig course?

CLIMATE

Climate is the *average* conditions of temperature, rainfall, winds, sunshine, cloudiness, and humidity. It should not be confused with *weather*. Weather deals with factors such as temperature and rainfall over a short period of time. Climate is the average of these conditions over a period of many years. The weather in Alberta may be hot and humid for the first two weeks in June. But Alberta's climate cannot be described as hot and humid.

The climate of a place is determined by many factors, the most important of which are (1) latitude, (2) altitude, (3) distance from large bodies of water, (4) winds, (5) ocean currents, and (6) mountains. In most cases, temperature decreases as distance from the equator increases. This is because the rays of the sun strike the earth more directly in the equatorial regions than in the polar regions. *Fig. 5* Since direct rays of the sun heat more effectively than oblique rays, the places close to the equator should be warmer than those farther away. Thus Jamaica in the West Indies has a much warmer climate than Canada.

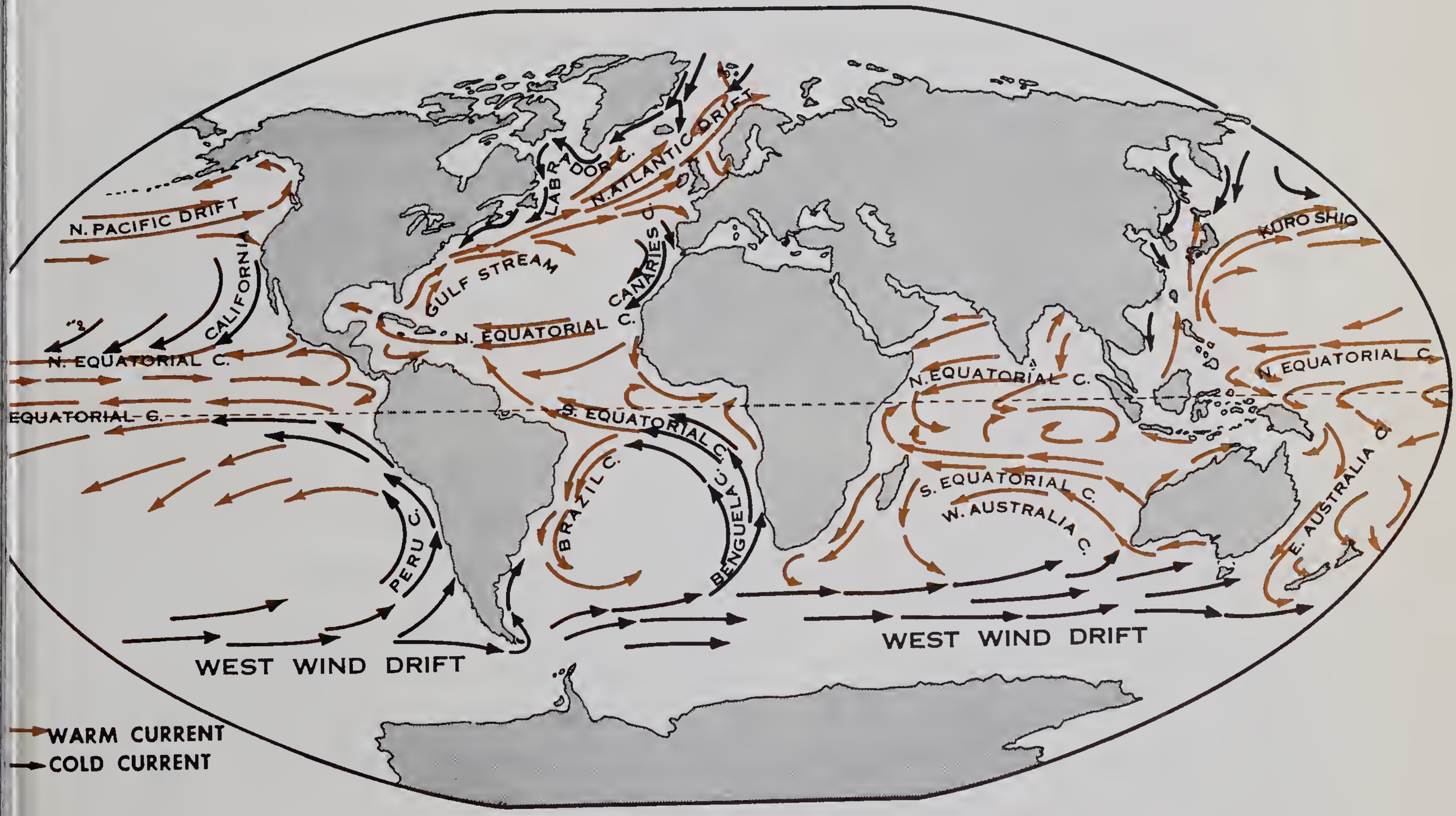
Temperature normally drops at the rate of 1°F for every 300 feet of increase in *altitude*. As a result, mountain and plateau lands are cooler than nearby lowlands. There are many high *p. 116* mountains in the tropical regions of East Africa whose peaks are always covered with snow.

A *large body of water* warms up much more slowly during the summer than does the adjacent land. Thus, if a place is close to a large body of water, a wind from over the water will bring cool air which lowers temperatures, while a place far inland will not be influenced by the cool air and will be much warmer in summer. As winter approaches, the land loses its heat much more quickly than does the water, so that in winter the water is warmer than the land. Hence, in winter, winds bring warmth from the water to nearby land areas, making them much warmer than inland areas. A good example is the comparison of January temperatures in Victoria, B.C. with those in Calgary, Alberta.

Winds also have a strong effect upon temperatures and rainfall. If, for example, a place normally receives winds from over an ocean, summers are cooler and winters milder than might otherwise be expected, and rainfall is usually adequate. If, on the other hand, a place receives winds from the interior of a large land mass, summers are hotter and winters colder than might otherwise be expected, and rainfall is usually inadequate.

Ocean currents are streams of water which flow steadily from one part of an ocean to another. They are of two types: warm and cold. As winds blow over these currents, they are either warmed or cooled by them. If a land mass lies in the path of winds that have just passed over an ocean current, then the temperature of the current may have a very strong effect upon the temperatures experienced on the land mass. For example, the westerly winds that keep the coast of British Columbia so mild in winter have crossed a warm ocean current in the Pacific Ocean before reaching the coast.

Figure 10. Major Ocean Currents.
Ocean currents can greatly influence world climates in many parts of the world. Consult a good atlas to locate minor currents not shown here. Use the map to learn what makes a current warm or cold.


N. PACIFIC DRIFT
CALIFORNIA C.
N. EQUATORIAL C.
EQUATORIAL C.
LABRADOR C.
N. ATLANTIC DRIFT
GULF STREAM
CANARIES C.
N. EQUATORIAL C.
KURO SHIO
N. EQUATORIAL C.
N. EQUATORIAL C.
S. EQUATORIAL C.
PERU C.
BRAZIL C.
BENGUELA C.
S. EQUATORIAL C.
W. AUSTRALIA C.
E. AUSTRALIA C.
WEST WIND DRIFT
WEST WIND DRIFT
WARM CURRENT
COLD CURRENT

Warm air masses usually contain large amounts of water vapour, especially if they have come from over a warm sea. In places where moisture-laden air masses are forced to rise over high mountain ranges, heavy rainfall results on the windward slopes. In sharp contrast, a dry area known as a rainshadow occurs in the lee of the high mountains. This effect of mountain ranges is very noticeable in Western Canada where windward slopes in British Columbia are deluged with rain, while many parts of the Prairie Provinces suffer from lack of moisture. *Fig. 11*

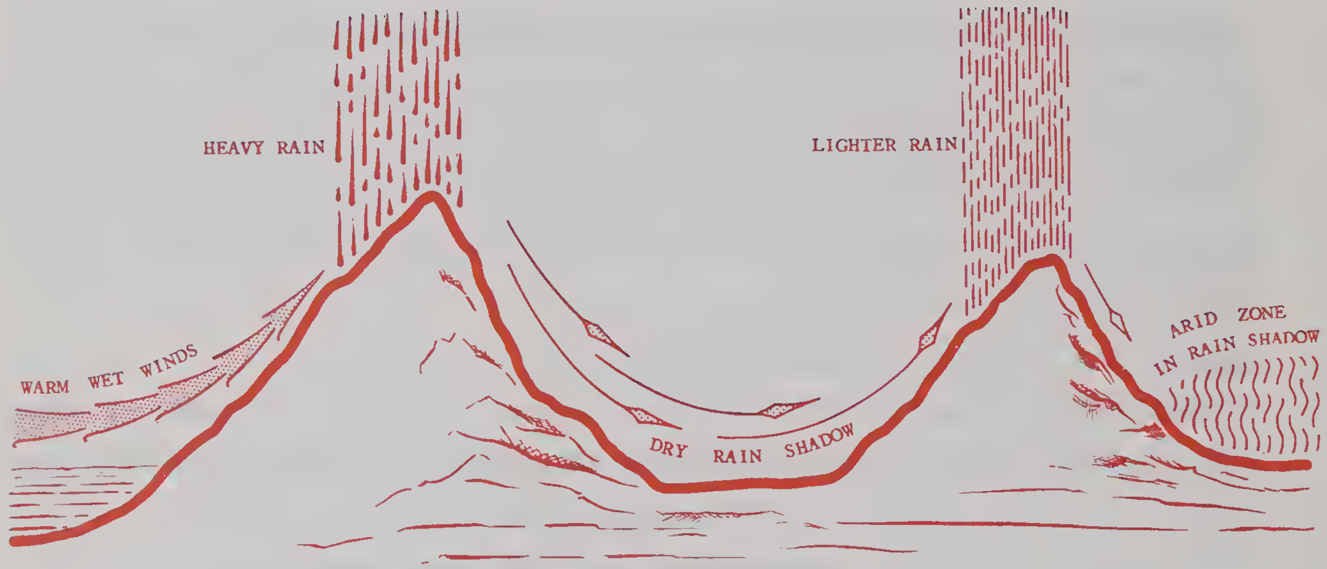


Figure 11. Relief Rainfall and Rainshadow.
When moisture-laden air is forced to rise over a range of mountains, the water vapour in the air condenses into raindrops as the rising air gets colder. This results in heavy rain, called relief rainfall, *on the windward slopes of mountains. It is heaviest when the air has come directly from over a large body of water. When the air begins to descend the other side of the mountains, it gets warmer to become a drying wind. This results in a dry area, called a* rainshadow, *on the lee side of a mountain range.*

WINDS

Air that moves parallel to the earth's surface is spoken of as *wind.* Winds are always named by the direction from which they come. Thus a wind from the west, blowing towards the east, is called a west wind. When a wind blows more often from one direction than from any other, it is called a *prevailing wind.*

Trade winds blow from the subtropical areas towards the equator. Also blowing from the subtropics are the *westerlies* which consist of air flowing towards the poles. Polar easterlies are bitterly cold winds from the frigid polar regions. There are also three belts of variable winds and calms. One is the *doldrums* which is found in the equatorial region between the two trade wind belts. The other two are *horse latitudes,* which are located between the trades and the westerlies in both the Northern and Southern Hemispheres.

The rotation of the earth on its axis causes the winds to be deflected in their attempts to move directly from one area to another. In the Northern Hemisphere, winds are deflected towards the right: whereas in the Southern Hemisphere, they are deflected towards the left. Thus the westerlies become southwest winds in the Northern Hemisphere, and northwest winds in the Southern Hemisphere. Likewise, the trades become northeast trades north of the doldrums and southeast trades south of the doldrums. The trades are the most steady winds of the earth, especially over the *Fig. 12*

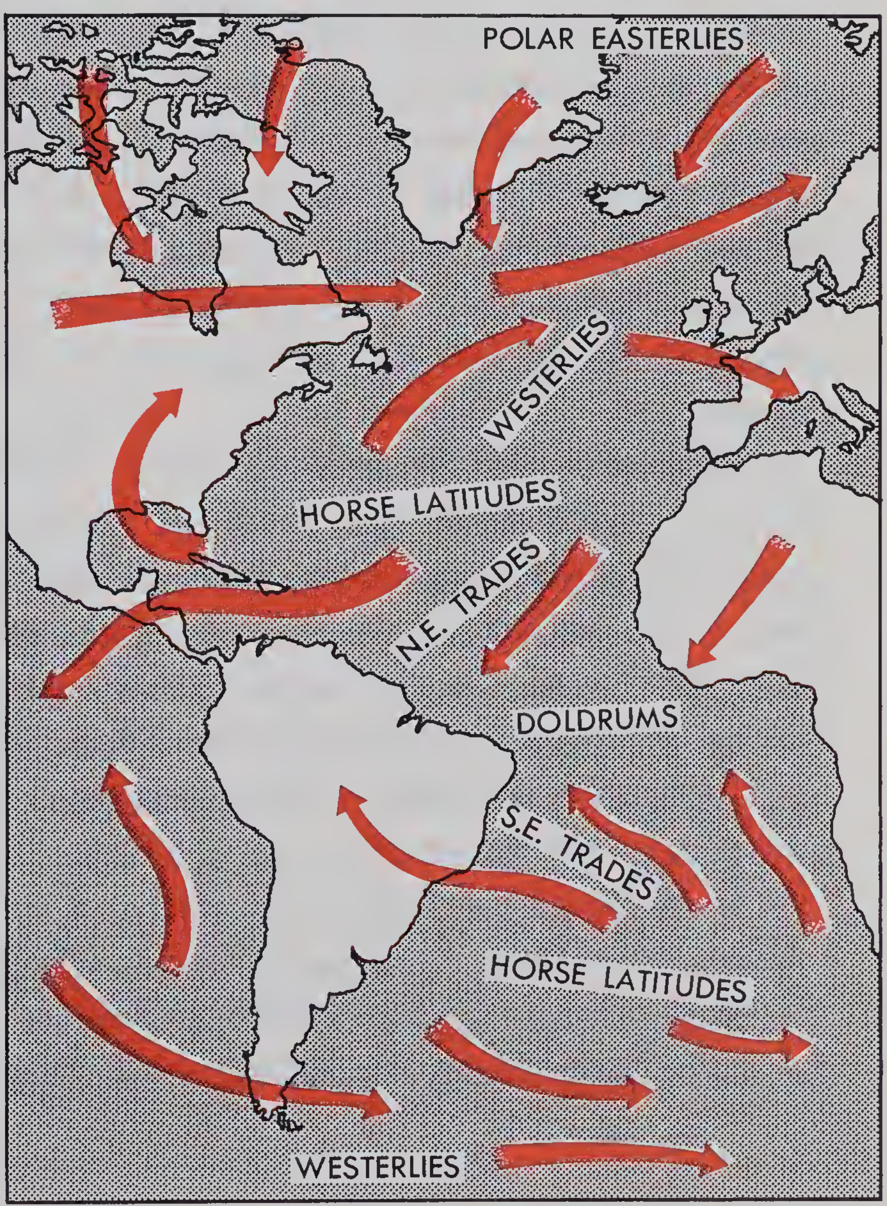


Figure 12. The Belts of Winds and Calms in the Atlantic Area.
With local variations in pattern, the belts of winds and calms illustrated here occur across the face of the globe.

oceans. In general, the trade wind belts have fine, clear weather with few storms. However, they do at times have violent storms known as hurricanes and typhoons.

The westerlies vary greatly in direction and strength. They get their name only because the most frequent and strongest winds come from the west, and not because the wind always comes from the west.

Conditions in the horse latitudes and doldrums contrast sharply with each other. The horse latitudes are regions of light winds, clear sunny skies, and little rainfall. The doldrums are stormy, with alternating squalls and light winds and hot, humid weather.

FACTORS THAT DETERMINE MAN'S OCCUPATIONS AND HIS STANDARD OF LIVING

Man's activities and his standard of living are affected by his surroundings or, in other words, the general geography of the area in which he lives. By standard of living, we mean how well man lives and how many luxuries he enjoys. Some important factors influencing man's way of life in various parts of the world are (1) landforms, (2) climate, (3) natural vegetation, (4) soils, (5) location, (6) transportation facilities, and (7) natural resources.

Landforms Landforms are the irregularities of the earth's surface, which take the form of mountains, hills, plateaus, or plains. Rugged mountains make travel difficult and offer little level land for cultivation or for the construction of homes and factories. Mountainous areas usually support fewer people than nearby lowlands, which offer level land for transportation routes, crop production, and the construction of cities. Approximately nine-tenths of the world's people live on lowlands.

Landforms, especially mountain ranges and plateaus, also have a powerful influence upon climate. They cause marked changes in temperatures and large variations in the amount of rainfall received from place to place on the earth's surface. The mountains of eastern Australia cut the interior off from the moisture-laden winds, making it a vast dryland of very limited value. In East Africa, on the other hand, the highlands of Kenya offer pleasant living conditions in an otherwise hot, wet country.

Climate Climate affects many other natural conditions such as native vegetation, wildlife, and soils. It often determines the nature of the major occupations of any region. For example, constantly hot, wet regions are normally clothed with dense tropical forests and floored with coarse infertile soils. Semi-dry regions with cold winters and hot summers are usually covered with short grasses and blessed with fertile soils. Climate also affects travelling conditions, fishing, and most other human activities. Farming is especially affected because it is so dependent upon adequate rainfall, suitable temperatures, and fertile soils. Where rainfall is inadequate, but soils are good and water is available, man can raise crops successfully by irrigating the land.

Natural Vegetation Man has destroyed or altered much natural vegetation. Forests have been cut to provide fuel and wood products or to make way for farms and communities. Many natural grass lands have been converted into valuable grainfields and other crop lands. Areas still in grass feed countless herds of cattle and flocks of sheep and goats. In forested areas, man makes his living from the bountiful harvest of lumber, pulp, paper, and other wood products. In many remote forest regions, furs and meat from wildlife still provide the chief means of support for the inhabitants.

Soils Where soils are too thin, stony, heavy, or infertile to grow good crops, the people turn to livestock raising or to an *p. 61*
occupation that is not dependent upon the condition of the soil. Rich soils, on the other hand, often support teeming rural populations, such as those living in the fertile lowlands of India and China.

Location Man's location in the world also affects his life. If he lives near a coast, for example, he may depend upon the sea for food or for his livelihood as a fisherman or sailor. Coastal *p. 63*
location also encourages people to develop trade and commerce

with distant peoples and to cross the seas in search of wealth and adventure. Such was true of the Spanish, Portuguese, English, and French; while until recent times, the land-locked Russians tended to isolate themselves from the rest of the world.

Transportation The availability or lack of good transportation facilities also affects the inhabitants of any region. Inaccessible areas seldom have dense populations and are often inhabited by primitive peoples. This is true of Canada's northland and of many sections of Australia and Malaya. On the other hand, roads, railways, waterways, and other means of transportation encourage economic development and, thus, raise standards of living.

Natural Resources The availability of valuable natural resources is the principal factor which determines the standard of living attained by any group of people. Fertile lowlands with favourable climate often support prosperous farmers, as do the Canadian prairies. In India and China, however, this it not true. While the soils are fertile and the climate favourable, the density of population is so great that each person's share of the benefits from them is small.

Rich mineral deposits, like those in our Canadian Shield, provide good jobs and considerable profits for many people. However, the human activity most often associated with a high standard of living is large-scale manufacturing. The benefits of modern machinery and mass-production methods produce (1) higher-than-average incomes and (2) a large supply of high-quality manufactured goods. Living conditions in the large industrial centres of Canada illustrate this fact well. In order to achieve a high level of industrialization, a region must possess or have easy access to large supplies of raw materials, power, and skilled labour; a good transportation system; and customers able to buy its manufactured goods.

The British Isles

The British Isles consist of a group of islands located in Northwest Europe between the North Sea and the Atlantic Ocean. This island group lies between 49° and 61° north latitude and between 11° west and 2° east longitude. Use your atlas to see how the latitudinal limits of the British Isles are almost the same as those of Alberta. The relative significance of this small group of islands on world affairs has been much greater than its size alone would indicate.

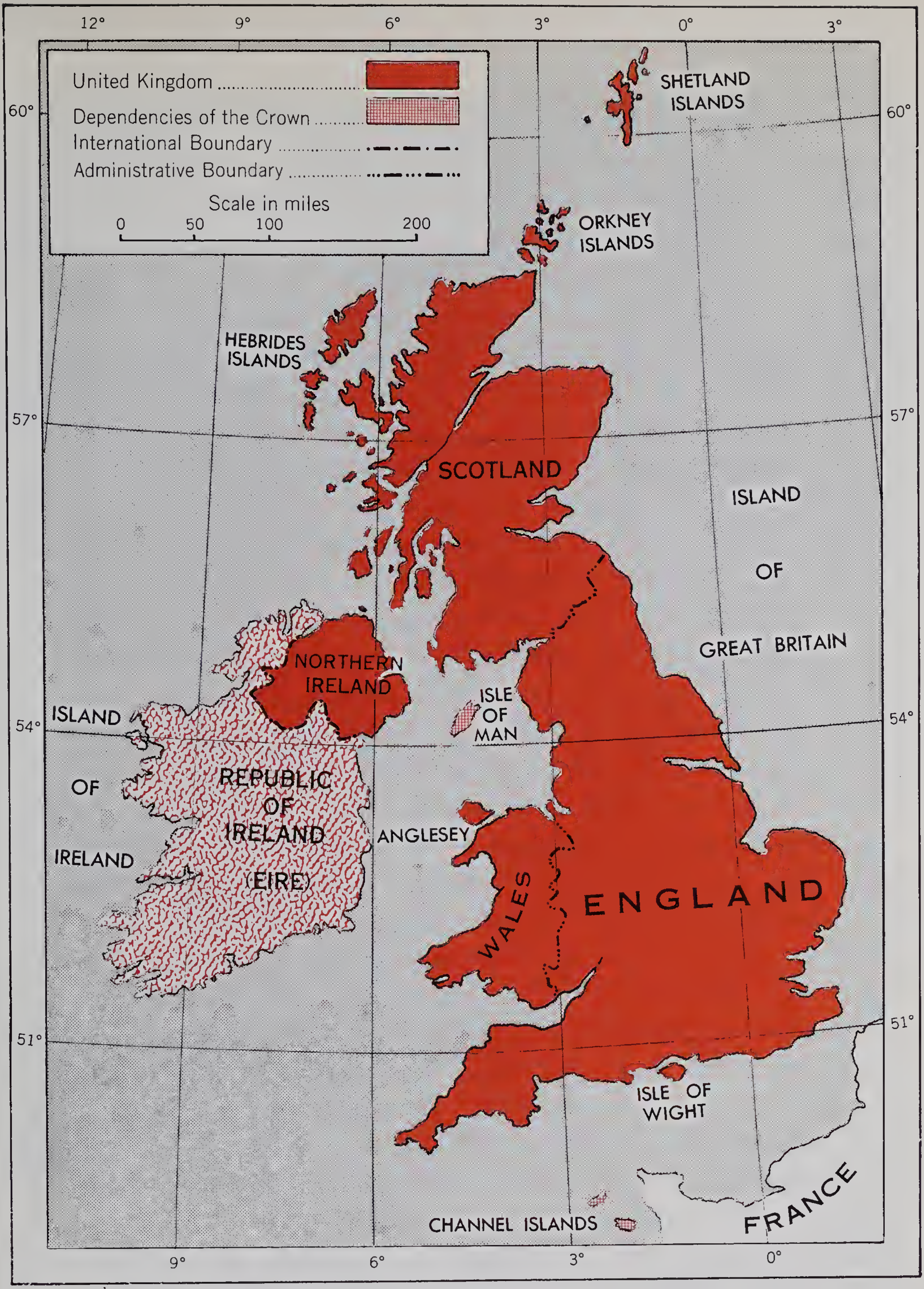
Entirely surrounded by water, Britain owes much of her earlier development to the skill and daring of her sailors. When the lands of the western hemisphere were being discovered, British explorers charted many of the new areas, claiming them for the Crown. Britain was no longer at the edge of the known world; she was at the centre, and her busy ports became the hub of world trade.

Many of her people, restricted by the size of their islands and by the growing population, left to share the rich resources of the newly claimed lands. These settlers took with them a heritage of culture and civilization which still endures. The new countries provided both raw materials to feed Britain's expanding industry, and an additional market for her manufactured goods. Emigration continues; Canada and other nations receive many new citizens from Britain each year. But the traffic is not in one direction only; descendants of the early settlers return to the British Isles in increasing numbers to study at her famous universities, to work in her industries, or, simply as tourists, to see the land of their ancestors.

Map 1 The British Isles consist of the two large islands of Great Britain and Ireland and over five thousand islands of much smaller size. Occupying the islands are two nations—the United Kingdom of Great Britain and Northern Ireland and the Republic of Ireland. The United Kingdom includes the northern portion of the island of Ireland, Scotland, England, Wales, and several small island groups, such as the Hebrides, Orkney, and Shetland Islands to the north, the Isle of Wight to the south, and Anglesey to the north of Wales. Although these areas still maintain their identities, they are all parts of the United Kingdom. The Republic of Ireland occupies the southern portion of the island of Ireland and the small adjoining islands. Two other island areas worth mentioning are the Isle of Man in the Irish Sea between England and Ireland, and the Channel Islands off the coast of France. Both of these areas are dependencies of the United Kingdom, but are not considered a part of it.

By far the largest island of the British Isles, and in fact the largest island in Europe, is Great Britain which contains Scotland, England and Wales. It is approximately 600 miles in length from north to south and varies from 30 to 300 miles in width. The island of Ireland is only about one-third as large as Great Britain, and the other islands are very much smaller. With a total area of about 121,000 square miles, the British Isles are less than one-thirtieth the size of Canada. Of the total area of the islands, the United Kingdom occupies about 94,000 square miles and the Republic of Ireland about 27,000 square miles. Thus, the United Kingdom is about one-third the size of Alberta, and Ireland is approximately the size of the Province of New Brunswick.

Since early times the British Isles have been divided into small territorial divisions called counties. Originally, these units were the land controlled by a local nobleman, and later by a sheriff who acted on behalf of the king. In England the term shire was often used to refer to these territorial divisions (sheriff=shire reeve). Some counties still retain that term within their names, e.g. Lancashire, Cheshire, Yorkshire, and Shropshire. The county is the chief unit for administrative, political, and judicial purposes. In this book


United Kingdom .... 🟥
Dependencies of the Crown .... ▨
International Boundary ....
Administrative Boundary ....
Scale in miles
0 50 100 200
12° 9° 6° 3° 0° 3°
60° 57° 54° 51°
SHETLAND ISLANDS
ORKNEY ISLANDS
HEBRIDES ISLANDS
SCOTLAND
ISLAND OF GREAT BRITAIN
NORTHERN IRELAND
ISLE OF MAN
ISLAND OF IRELAND
REPUBLIC OF IRELAND (EIRE)
ANGLESEY
WALES
ENGLAND
ISLE OF WIGHT
CHANNEL ISLANDS
FRANCE
9° 6° 3° 0°

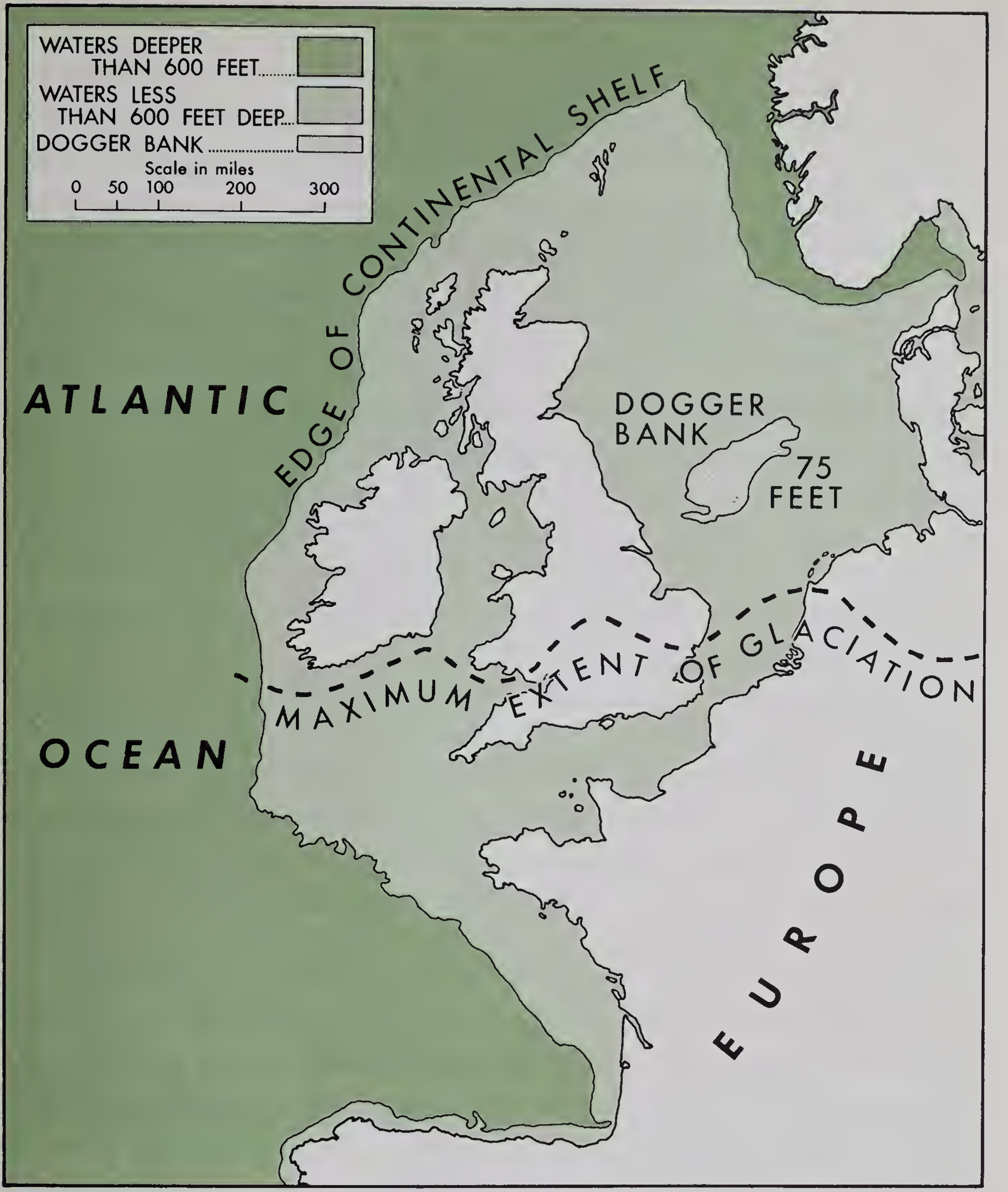
Map. 1. Political Areas.
Although the United Kingdom is one political unit, the boundaries of Scotland and Wales are shown, and the Isle of Man and the Channel Islands are indicated. These areas still retain their individual characteristics, and there is some difference and a degree of independence in local administration.

an attempt has been made to use references to the counties as seldom as possible so that it will not be necessary to know the location of all of the counties to understand the topics discussed. However, where the county is an important geographical region as well as a political unit, the name of the county is used.

Despite their small size, the British Isles are of great importance in the world, especially the United Kingdom whose international influence is surpassed only by that of the United States and the Soviet Union. Geographical factors have done much to enable Britain to become a great nation. The availability of large supplies of coal was one of the most important factors as it provided the fuel necessary for the development of industry and transportation in Britain. Also vital was an energetic and intelligent population, because without progressive and ambitious people the presence of good coal and other natural advantages possessed by Britain would have been worthless. For example, Watt's refinement of the steam engine and the development of power machinery were essential to Britain's growth to world leadership in manufacturing.

Great Britain's development as a powerful nation was greatly aided by its location close to the mainland of western Europe, which for many centuries was the centre of world business and industry. At the same time, its separation from the mainland of Europe also aided its advancement. Controlled by her navy, the water surrounding the islands kept out many foreign invaders who would have caused destruction and wasted the energy of the British people in defence. As it happened, Britain fought her wars away from home and enjoyed a period of almost 900 years when no foreign invaders landed on British soil. This allowed her to develop her factories, mines, farms, and trade while other European competitors were engaged in destructive, wasteful wars in their own lands. Many skilled workers fled from the wars of the mainland to Britain. Their crafts, added to the energy, skills, and inventive genius of the British people, led to leadership in trade and industry.

When the development of the factory system spread from Western Europe to Eastern North America, Britain was placed in a key position between the two chief industrial areas of the world and she


WATERS DEEPER THAN 600 FEET
WATERS LESS THAN 600 FEET DEEP
DOGGER BANK
Scale in miles
0 50 100 200 300
EDGE OF CONTINENTAL SHELF
ATLANTIC
OCEAN
DOGGER BANK
75 FEET
MAXIMUM EXTENT OF GLACIATION
EUROPE

Map 2. The Continental Shelf.

In geologically recent times the islands that comprise the British Isles formed part of the mainland of Europe.

was able to increase her lead in world trade and industry.

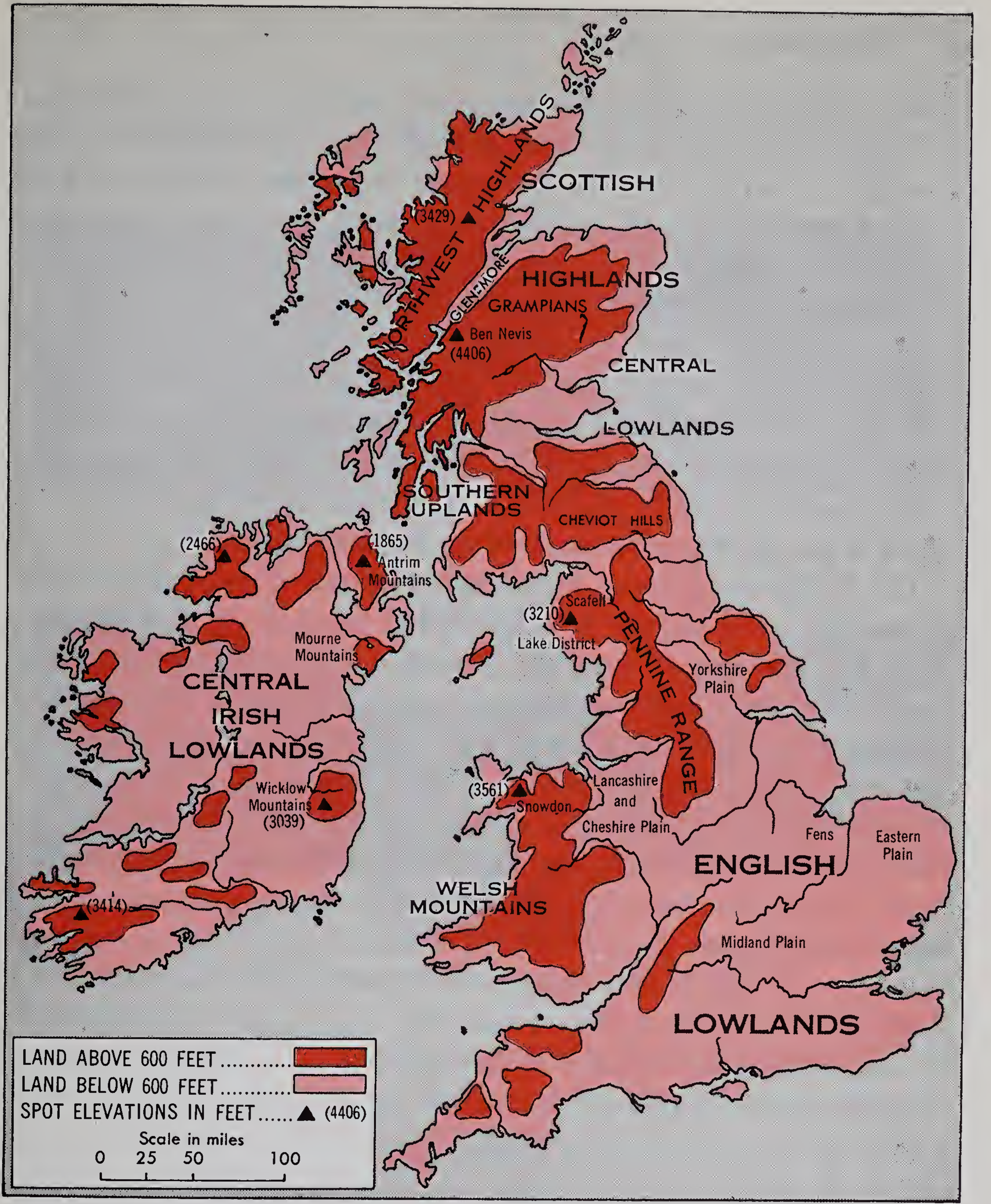
The island location, plus the long indented coastline which provided good harbours, was another advantage which Britain had in the development of commerce. Many of her people naturally turned to the sea for a living and built for Britain a large fleet of merchant ships which encouraged trade and formed the basis of a strong navy. Consequently, British ships sailed, explored, and eventually came to control the major sea routes of the world. Naval supremacy and a desire to sell her vast industrial output prompted the British people to acquire colonies by claiming or conquering them. Colonial resources flowed to Britain, and the colonies in turn provided markets for Britain's busy factories. Many of the profits earned by the British during this period of prosperity and expansion were invested in foreign lands and brought more profits to the prosperous little island. Thus, control of the seas, the operation of a huge merchant fleet, the development of colonies, a vast factory output, large foreign investments, and the energy and daring of her people enabled Britain to rise to a commanding position among the commercial nations of the world.

During the late eighteenth, all the nineteenth, and the early twentieth centuries Britain maintained her leading trade position, but after the First World War she began to lose her leadership to the United States. Today she has several other serious competitors in the world's markets, especially Germany, the Soviet Union, and Japan. Britain's participation in two costly World Wars and the rise of these serious trade competitors largely explain why Britain is no longer the main trading and banking nation of the world.

What has just been said about Britain's prosperity and world influence was not true of Ireland. Since it was largely agricultural, producing little more than bare necessities and sometimes not even those, Ireland took little part in world trade and the Republic is still unimportant as a commercial nation.

LANDFORMS

Several thousand years ago, the British Isles were connected to the mainland of Europe, but sinking land and rising water from melting glaciers detached them from the continental mainland and created a large area with a shallow ocean floor called a continental shelf. The British Isles rise out of this area of shallow sea which is less than 600 feet deep. *Map 2*


SCOTTISH
HIGHLANDS
NORTHWEST HIGHLANDS
(3429)
GLEN MORE
GRAMPIANS
Ben Nevis
(4406)
CENTRAL
LOWLANDS
SOUTHERN UPLANDS
CHEVIOT HILLS
(2466)
(1865)
Antrim Mountains
Mourne Mountains
CENTRAL IRISH LOWLANDS
Wicklow Mountains
(3039)
(3414)
Scafell
(3210)
Lake District
PENNINE RANGE
Yorkshire Plain
(3561)
Snowdon
Lancashire and Cheshire Plain
WELSH MOUNTAINS
Fens
Eastern Plain
ENGLISH
Midland Plain
LOWLANDS
LAND ABOVE 600 FEET
LAND BELOW 600 FEET
SPOT ELEVATIONS IN FEET ▲ (4406)
Scale in miles
0 25 50 100

Map 3. Landforms.

GREAT BRITAIN

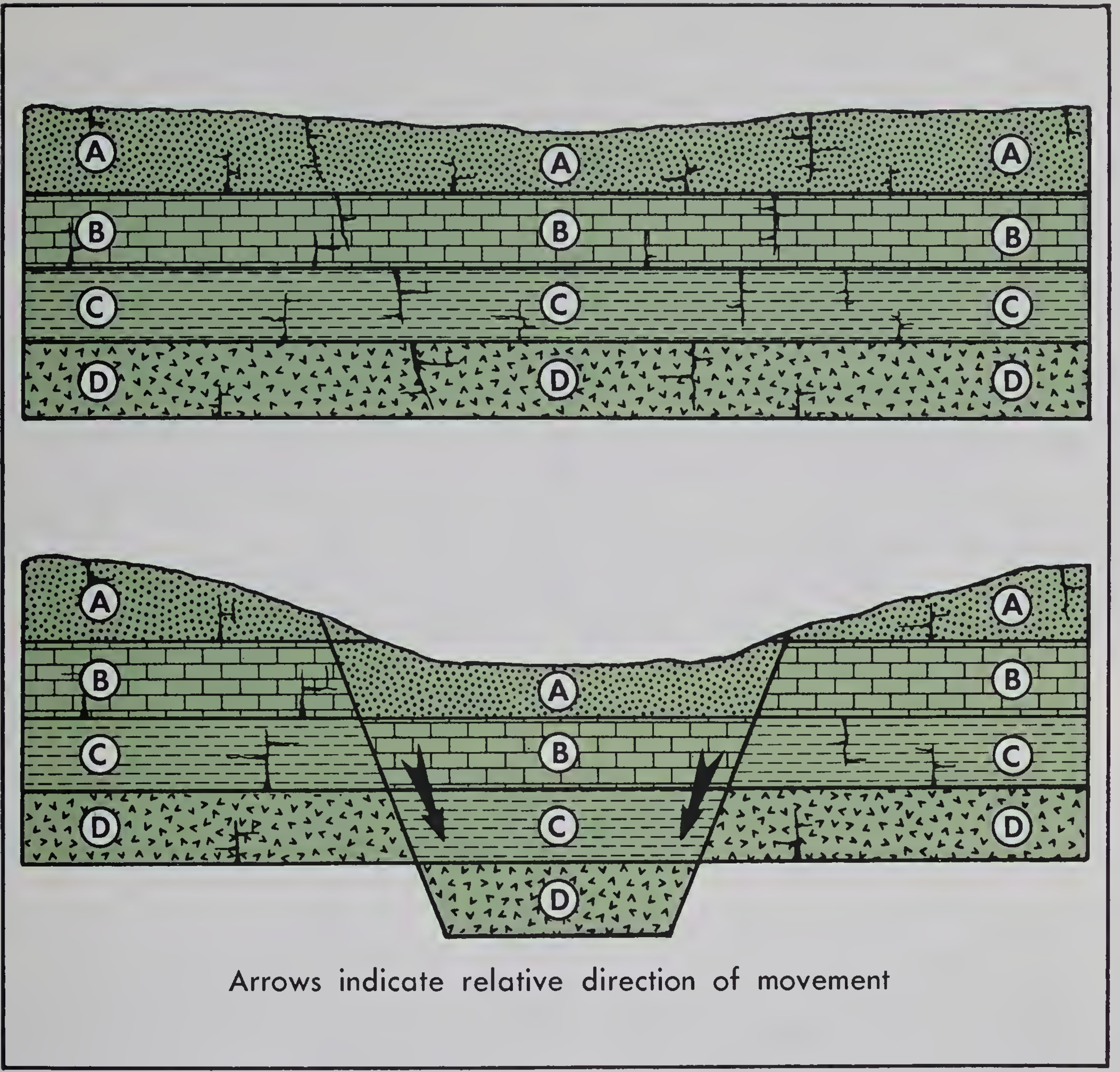
Great Britain is made up of several separated highland areas which are surrounded by generally rolling and hilly lowlands. A large, rich plain that seldom rises over 1,000 feet above sea level occupies central, southern, and eastern England. Making up one-third of Great Britain, this English Lowland is really a part of the *Map 3*

Great European Plain of the mainland and is the main industrial and agricultural area of the British Isles. The much smaller Central Lowland of Scotland is the only other important lowland area of *Fig. 1* Great Britain. It is a *rift valley,* which means that it is a great mass of land that has slipped down between two huge parallel cracks (faults) in the surface of the earth.

The highland areas of Great Britain, averaging between 500 and 2,000 feet above sea level, make up most of Scotland and Wales, much of northern England, and the southwestern peninsula of England. The highest mountain is Ben Nevis in the Scottish Highlands, which has an elevation of 4,406 feet. Mount Snowdon (3,561′) in Wales is the highest peak south of the Scottish border.

The Scottish Highlands in the northern part of Scotland are the highest and most rugged of the highland areas of the British Isles. They can be divided into the Northwestern Highlands and the Grampians. Both areas are barren, mountainous regions, but the Grampians to the south are higher and more rugged than the northern sections. Separating these two areas, and stretching from one side of the island to the other, is Glen More which is a rift valley like the Central Valley of Scotland. The small Caledonian Canal, which was built through the valley taking advantage of its lakes and nearness to sea level, provides a short route across the island but its use is now largely restricted to pleasure boats. The Highlands reach the coast on the west, but slope gently towards the east coast where there is a narrow lowland. So little flat land is available in the Highlands that farms are few and the only towns are found on the coastal lowland. Very few people live in the Highlands because the soil is very thin and infertile, and the climate too cool and wet. Most of the inhabitants are shepherds whose sheep graze on the damp slopes. In summer, however, many tourists come to enjoy the picturesque scenery, and a few to hunt deer and grouse.

Although separated from the mainland, the Hebrides, Shetland and Orkney Islands may be considered part of the Scottish Highlands because they are the tops of partly submerged and now disconnected sections of the Highlands. The surface of these northern


A
B
C
D
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D
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D
A
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C
D
A
B
C
D
A
B
C
D
Arrows indicate relative direction of movement

Figure 1. Formation of a Rift Valley.
A rift valley is a valley which has been formed by the sinking of land between two parallel "faults." Such a valley is usually long in proportion to its width. The diagrams above indicate the relative positions of rock formations before and after the formation of a rift valley.

islands is usually low and rolling with many areas of bare rock or peat bogs. Solitary, steep-sided hills now stand where mountains once towered.

The Central Valley, discussed earlier, separates the Scottish Highlands from another range of hills to the south, the Southern Uplands, which are much lower and less rugged than the Scottish

Highlands, with wider and more usable valleys.

The southern part of the Uplands along the English border of Scotland is known as the Cheviot Hills. Very similar to the Southern Uplands of Scotland is the Pennine Chain of northern England, running north to south. West of the northern Pennines, is a famous area of low, rounded mountains, narrow steep-sided valleys, and beautiful lakes called the Lake District. *Fig. 2*

Like the other highland areas of Britain, the Welsh Mountains are low, bare, rounded, and very wet; the highlands of southwestern England across the Bristol Channel are even lower but much drier than the other highlands.

Figure 2. The Lake District.
This famous district of northwest England is characterized by rugged hills and low, rounded mountains. Numerous small "tarns" (lakes) lie in the hollows that have been gouged out by glacial action. The picturesque scenery and historic associations attract many tourists to this area.

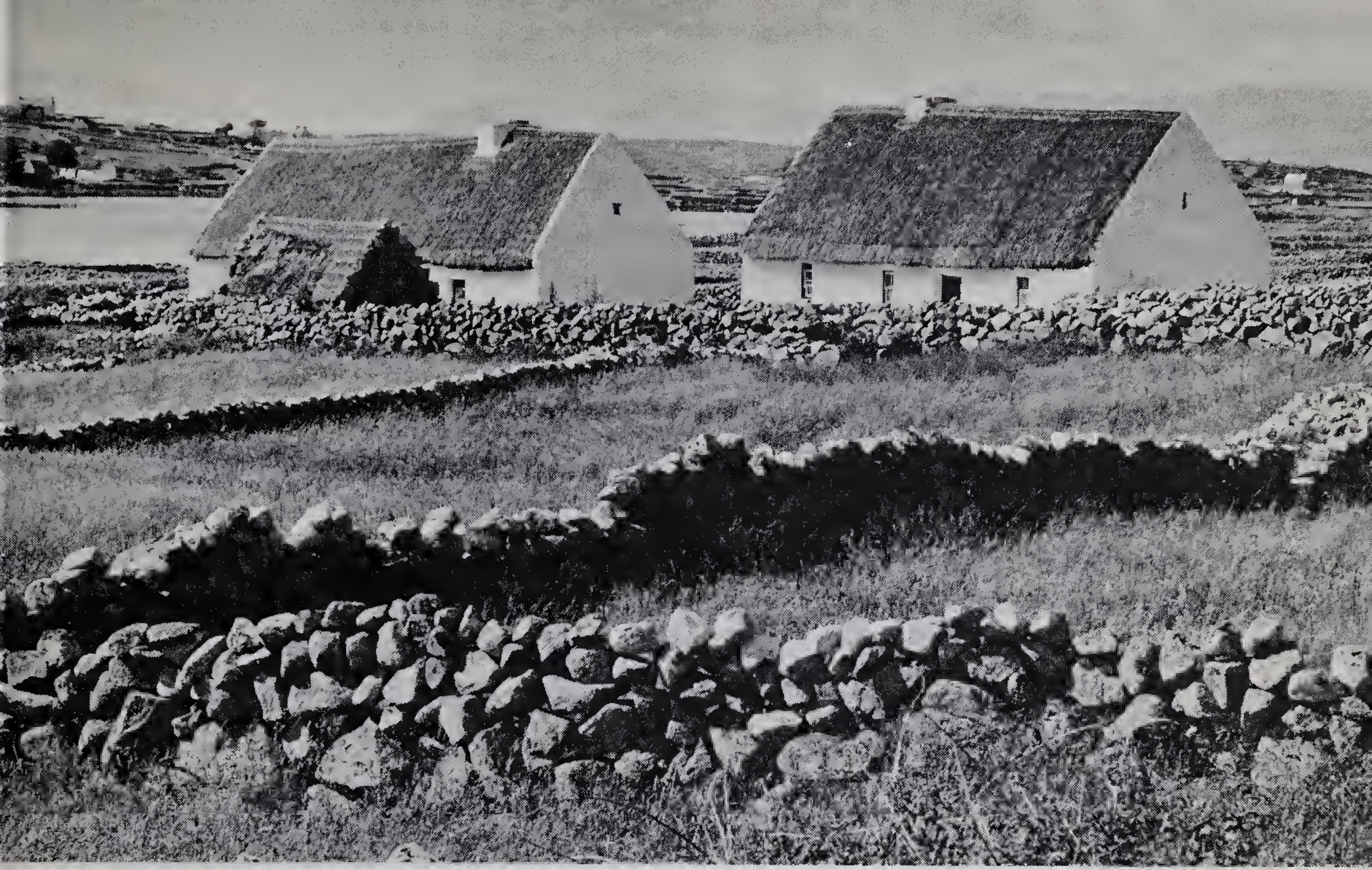


Figure 3. Typical Irish Countryside.
The low-lying, poorly drained land is divided into small fields by stone fences. The heavy rainfall and cool climate encourage a lush growth of grass but discourage crop production. The whitewashed buildings with their thatched roofs are typical of this area.

IRELAND

The surface of Ireland resembles a very irregular and shallow saucer with a large, low-lying central plain surrounded by a much-disconnected rim of low, rounded mountains that are isolated fragments of those in western Britain. Although there are also mountains rising from the plain, most of it is so low and has so little slope that drainage is poor. Underlying this water-logged central plain is limestone rock which has caused what is known as a *karst* region. Such areas are characterized by underground streams, sinkholes, low-lying lakes, and bogs. *Sinkholes* are hollows in the limestone through which water enters an underground drainage system. Rain water falling through the air combines with carbon dioxide to form a weak solution of carbonic acid. This solution dissolves great hollows in the soluble limestone bedrock. In Ireland these great hollows are occupied by many low-lying lakes and *Fig. 3* thousands of peat bogs which occupy 15 per cent of the island. *Bogs* are areas of wet, spongy ground made up of decayed or decaying *Fig. 4* vegetation, usually moss. The peat is a brown or black fibrous matter which forms from the decayed vegetation and is thought to be the first stage in the development of coal.

Rocks of the Lowlands and Highlands The lowland plains of the British Isles are covered with soil which has been formed by the breaking up of underlying soft rocks and the laying down of materials by great sheets of ice, called glaciers, which once covered all of the British Isles except Southern England. The glaciers scraped the soil off the highlands and deposited it in various patterns as glacial drift on the lowlands; rounded the tops of both hills and mountains; deepened and widened several valleys; and gouged out many mountain lakes, especially in Scotland where they are called *tarns.* In Ireland, glacial material (drift) laid down by the huge glaciers dammed up former river valleys to form lakes and created many low hills and ridges.

Many of the harder, weather-resistant rocks of the highland areas are *igneous rocks,* such as granite. These rocks were formed when hot, liquid material, such as lava, cooled and hardened into solid form. This process occurred either when the surface of the earth first cooled and solidified hundreds of millions of years ago, or in more recent ages when hot, liquid materials from the core of the earth escaped through cracks on to, or close to, the surface of the earth, then cooled and hardened into rocks.

The softer, younger rocks which make up the foundation of the lowland areas are chiefly *sedimentary rocks* which are usually formed in the following way. Rocks are broken down into small particles by a process called *weathering* in which certain agents in nature attack and crumble, split, dissolve, or wear away the rocks. Some of the most common weathering agents are running water, frost, ice, rain, heat and cold, wind, and plants. Running water in the form of rivulets, streams, and rivers wears away rocks, especially when it is flowing quickly and rolling and pushing rocks along the bottom to act as grinding materials. When water in the cracks of rocks freezes, it expands, thus widening the cracks and eventually splitting the rocks in a wedge-like action. Great masses of ice (glaciers), which are often a mile thick, wear down, pluck away, and crush rocks as they flow along. When rain water combines with carbon dioxide in the air, it forms a weak carbonic acid solution which dissolves some types of rocks. We noted this phenomenon earlier in our discussion of the karst region of Ireland. A similar chemical process occurs when oxygen and carbon dioxide join with substances in the rocks to form compounds which are much softer than the original rock and, therefore, are much more easily dissolved or worn away. In hot areas the rays of the sun heat the rocks during the day causing them to expand. At night they cool and contract. This constant swelling and shrinking causes the rock to break up near the surface. Wind also weathers rocks by blowing loose

Figure 4. Peat, Cut and Piled for Winter Use.
In many of the more remote areas of the British Isles, peat is commonly used for fuel. This picture was taken on the northwest coast of Scotland. In this community everyone cuts peat from common land yearly and stacks it for winter use.

particles, especially sand, across the face of rocks, thus wearing away their surfaces in much the same way as sandpaper wears away wood. As plant roots grow and expand in the cracks of rocks, they split the rocks in the same wedge-type manner as frost action does.

The particles which thus result from the weathering of rocks are then transported by various means, but especially by rivers, to great bodies of water where they sink into layers according to particle size. This sediment builds up to a great thickness and massive layers of sediment are formed. Pressure created by the weight of the upper layers compresses the bottom layers into a new rock called sedimentary rock. Examples of this type of rock are sandstone, grit, and shale. Another type of sedimentary rock, of which limestone is the most important example, is formed from the skeletons of sea animals that have gradually been turned to rock at the bottom of great bodies of water. Such rocks are common in many land areas now, since the world's oceans and seas have not always had the same shores. It is of sedimentary rocks formed in the ways mentioned above that the foundations of lowland Great Britain and Ireland consist. Being softer than the highland rocks, they more easily break down into soil to form rich, fertile plains which are valuable for agriculture.

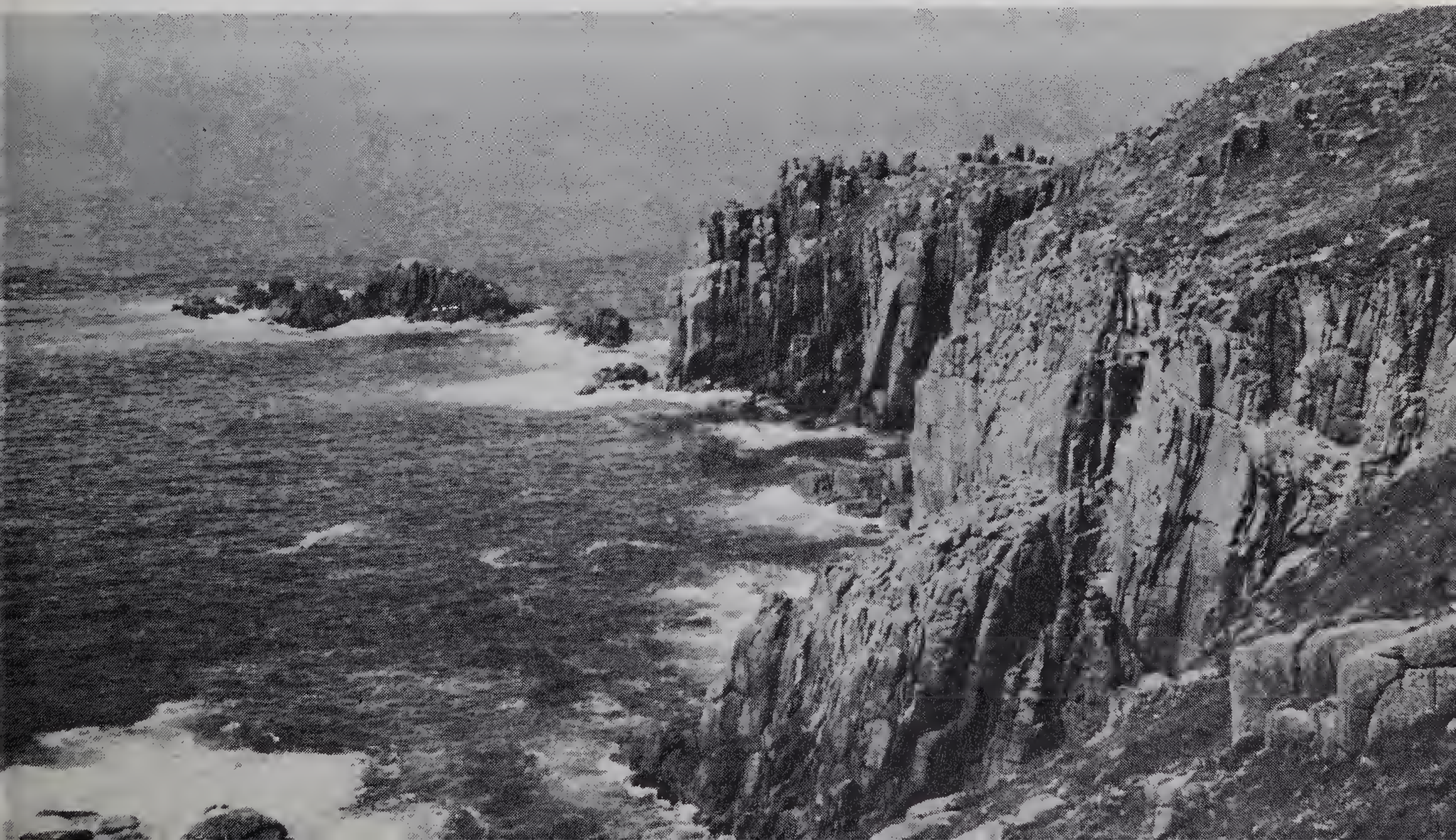
A third and last type of rock formation found in the world is known as *metamorphic ("changed") rock*. Original igneous or sedimentary rock formations may be altered by tremendous pressure and heat caused by the crushing weight of great glaciers or the folding and breaking of the earth's crust. Thus sandstone may become changed to quartzite, limestone to marble, and shale to slate. Igneous rocks can also be metamorphized or changed. Much granite in the highlands of Britain, for example, has been changed into rocks called granite schist. Most of the highland areas are made up of metamorphic and igneous rocks, both of which are generally older and harder than the sedimentary rocks of the lowlands. As a result, they weather much more slowly and provide a meager supply of soil.

Coal, which is found in sedimentary rock formations, is referred to as *organic rock,* but it is not a true rock. It is the remains of ancient forests which were encased in layers of sediment millions of years ago and changed into the material we now know as coal. This process came about as a result of the tremendous heat and pressure generated by the layers of sediment that were deposited over the decayed vegetation during the last 250,000,000 years. Great Britain has many large coalfields in the sedimentary rocks of the lowlands. They often flank the highland areas, however, where the edges of coal-bearing layers of sedimentary rock are exposed at, or near, the surface and can easily be reached by man. *Map 10*

Coasts The sea plays a vital part in the life of the British Isles because the numerous inlets, bays, and estuaries provide many excellent harbours. The United Kingdom alone has 300 ports. Such easy access to the sea naturally turns the British to such activities as fishing and merchant shipping for their livelihoods.

Since the mountains of Western Scotland, Northern England, and Wales and the highlands of the southwestern peninsula of England are close to the sea, the west coast and the shores of the southwestern peninsula are generally high and rocky. By contrast, the east coast of Britain is very low since it is flanked by the English Plain and the coastal plain of Scotland. The eastern half of the *Fig. 5*

Figure 5. Lands End, Cornwall.
These steep and rocky shores, often hundreds of feet high, are typical of the southwestern peninsula of England.



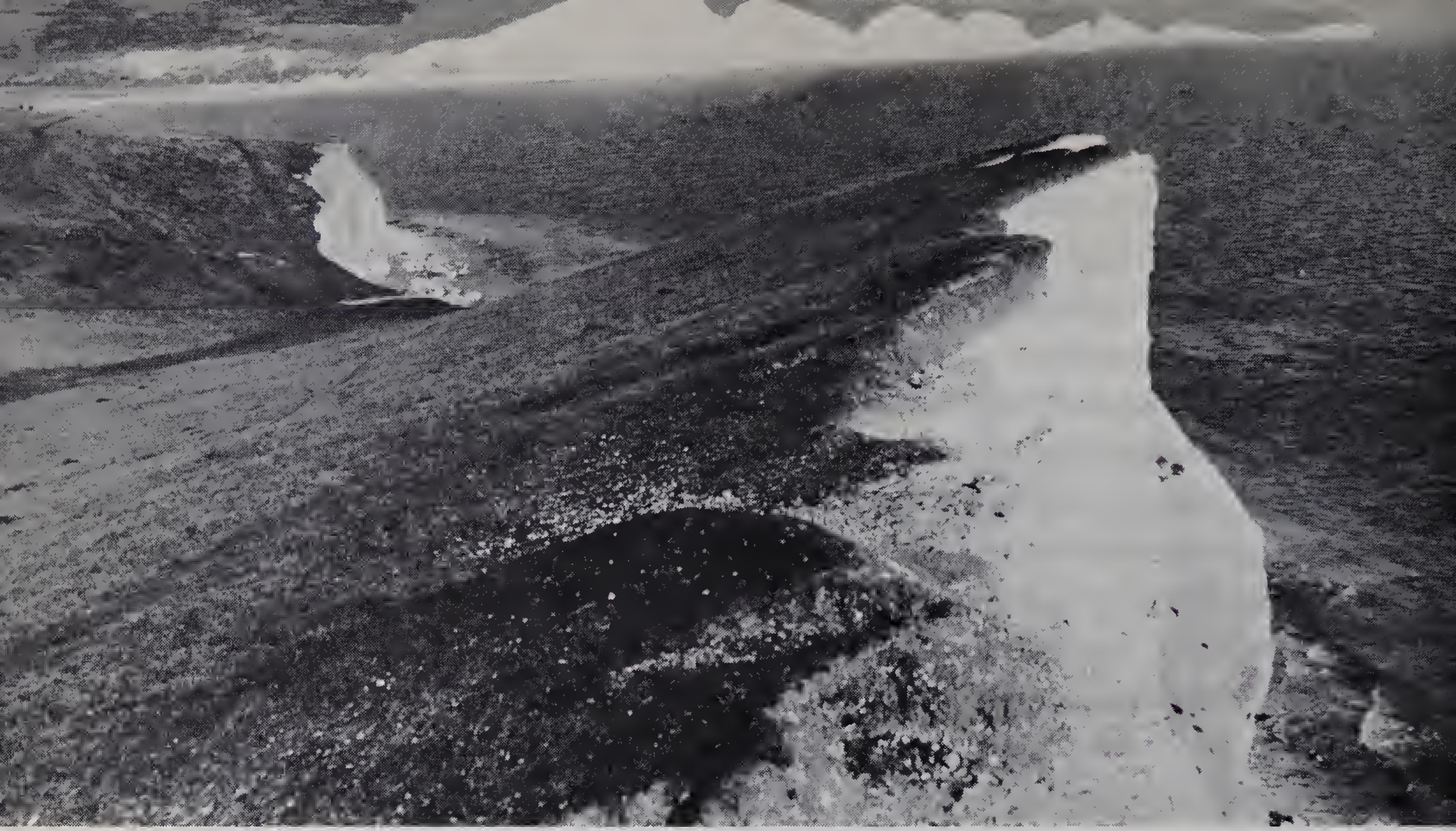


Figure 6. The White Chalk Cliffs of Southeast England.
Chalk is a soft, white type of limestone formed almost entirely from the skeletons of millions of tiny sea animals. Because chalk lands are suitable only for grazing, the coastal area is not farmed intensively.

English south coast is a compromise between these two extremes, *Fig. 6* since it is largely a low, clay shore with scattered white chalk cliffs for which it is famous. The coast of Ireland is generally rugged with many inlets. Where the mountains reach the sea on the west and the north, there are high cliffs. Parts of the mountainous west coast of Scotland and Ireland have long, deep, narrow bays with steep sides called *fiords*. Having been deepened and lengthened by the gouging effect of glaciers which reached the sea during the ice age, these inlets serve as good harbours for ports. However, the steep sides of the fiords make it difficult to build roads and railways to serve them, and the mountainous nature of the surrounding land prevents the development of prosperous agricultural and industrial areas. Fiord ports, therefore, are much less important than estuary ports which often serve heavily populated plains regions.

CLIMATE

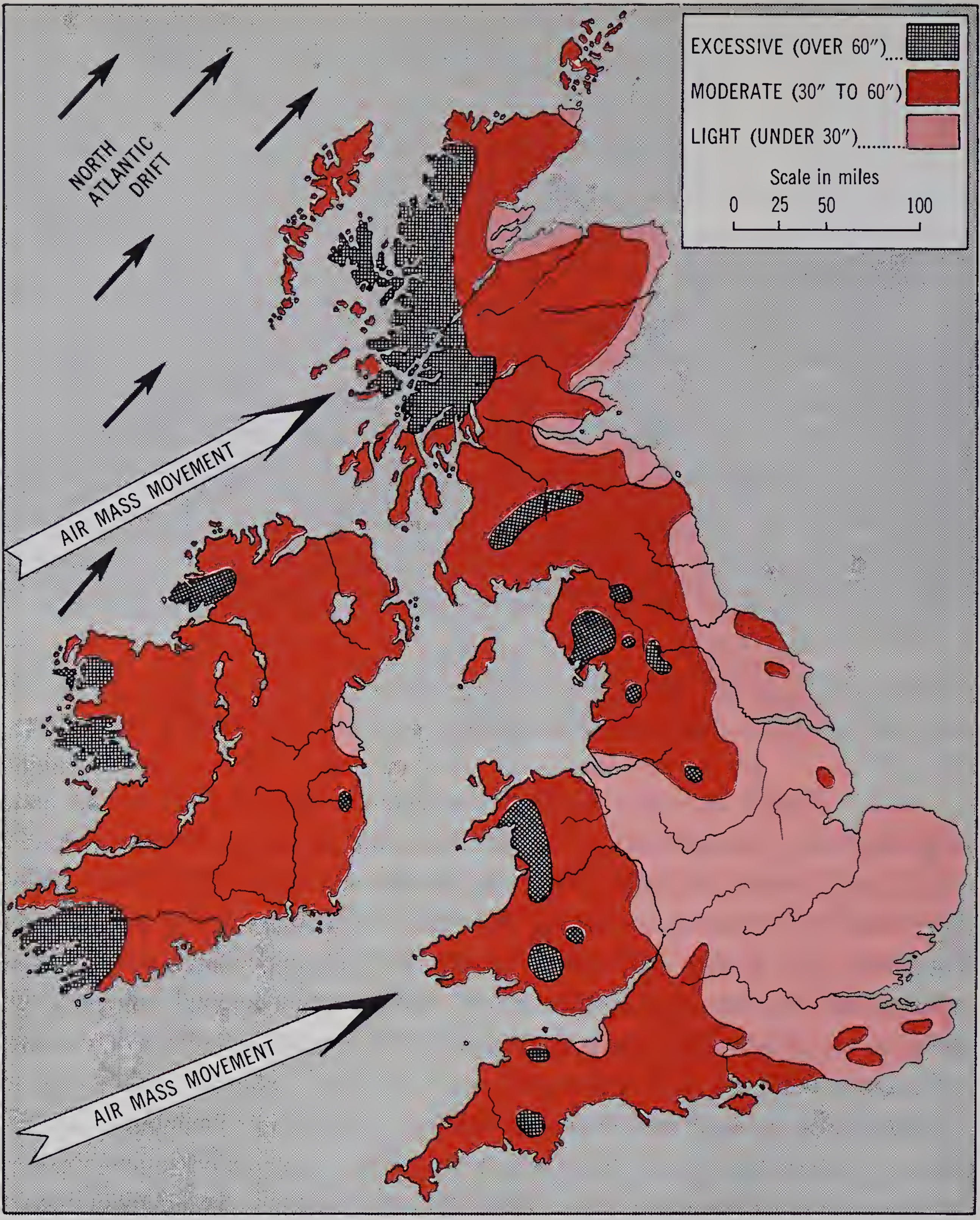
The climate of the British Isles is largely determined by their location close to the North Atlantic Drift and in the path of air masses which pass over that warm ocean current before reaching the islands. The heat and moisture obtained from the ocean current make the currents within the air masses into warm rain-bearing winds that bring the islands warmth in winter and plentiful rainfall throughout the year.

Map 4 Between 30 and 60 inches of rain falls in most of Ireland, Scotland, Wales, and western England, which receive the air masses directly from the sea. In areas where the moist air is forced up the western slopes of mountains and highlands, rainfall of over 60 inches is common, with several windward slopes drenched by more than 100 inches annually. Having lost much of their moisture in the western regions, the air masses bring less than 30 inches of rain per year to the coastal plain of Eastern Scotland and the lowlands of Central and Eastern England. Fall and summer are the wettest seasons and spring the driest. But no season is a true dry season in the British Isles, because the rainfall is well distributed throughout the year.

Map 5 As the North Atlantic Drift flows past the western shores of the British Isles, some of the warm water accumulates on the continental shelf and brings warmth to the adjacent west coast. In winter, this warming influence is so strong that the entire west coast is warmer than the east coast, including Southeast England. Occasional cold east winds from the frosty interior of nearby continental Europe also help to establish this abnormal north-south pattern of winter temperatures.

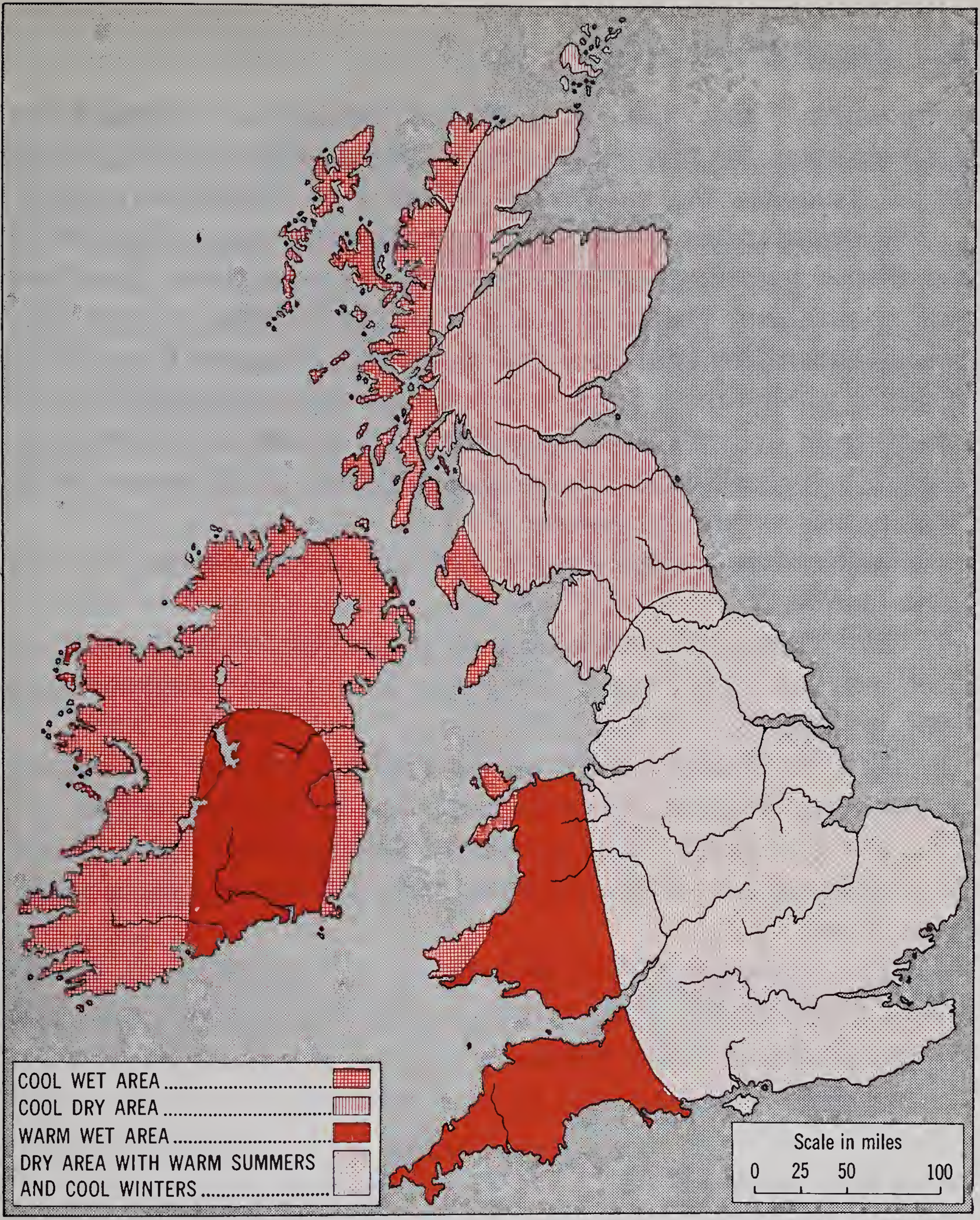
The strong effect of the warm North Atlantic drift becomes clear when we consider two Canadian areas. (1) At a similar latitude to that of the British Isles, but washed by the waters of a cold current from the Arctic, the Labrador Coast of Canada experiences below-freezing winter temperatures, while the winters of the British Isles are so mild that snow is rare on the lowlands. (2) London, England, has an average January temperature of 39° F, while that of Calgary, Canada, at approximately the same latitude, is 13° F.

The large bodies of water which surround the islands not only help modify the winter temperatures, but also keep summer temperatures from soaring. The British Isles seldom experience summer


EXCESSIVE (OVER 60")
MODERATE (30" TO 60")
LIGHT (UNDER 30")
Scale in miles
0
25
50
100
NORTH ATLANTIC DRIFT
AIR MASS MOVEMENT
AIR MASS MOVEMENT

Map 4. Annual Rainfall.

temperatures above 90° F. These moderate summer temperatures, combined with the greatly modified winter temperatures, give the islands a very low annual range of temperatures considering their distance from the equator. Calgary, Canada, which has neither an island location, nor a nearby warm ocean current, has an annual range of 48° F, compared with a range of only 24° F in southeast


COOL WET AREA
COOL DRY AREA
WARM WET AREA
DRY AREA WITH WARM SUMMERS AND COOL WINTERS
Scale in miles
0 25 50 100

Map 5. Climatic Zones.

England. The annual range drops to only 14° F in northwestern Scotland where the warming effect of the North Atlantic Drift in winter is greatest.

The generally mild winter temperatures make snowfalls very rare on the lowlands. In an average year, London gets snow on only 14 days. When the snow does fall, it usually is completely melted and gone within a few hours. It is only on the higher mountains that snow remains for months at a time. Being comparatively low by world standards, the mountains are not snow-capped in summer.

Fog occurs when clouds form close to the ground. The fogs of the British Isles are legendary, and multitudes of jokes have been told about them. Their more serious side is that they create a dangerous hazard for land, sea, and air travel. When the fogs are the result of water vapour forming around the tiny dust particles in the smoke from Britain's large industrial cities, a poisonous mist forms. Called "smog", this mist can be fatal to people who have any weakness in their respiratory systems.

Map 5 **Climatic Zones** The British Isles can be divided into four climatic zones:

(1) *The Northwest* (which includes projections of Wales, western Scotland, and all of Ireland except the South-Central region) has a cool, wet climate.

(2) *The Northeast*: (which includes the eastern half of Scotland and extreme northern part of England) has a cool, dry climate.

(3) *The Southwest*: (which includes South-Central Ireland, most of Wales, and the southwestern peninsula of England) has a warm, wet climate.

(4) *The Southeast*: (which includes all of England except the extreme northern and southwestern parts) has a dry climate with warm summers and cool winters.

WORK UNIT 1

The Language of Geography In this section of the book you encountered many terms which are peculiar to the vocabulary of the geographer. In the remaining sections, you will encounter more. It is suggested that you compile a reference list of these terms in your notebook with their definitions. Try to make them part of your vocabulary. To begin your list, define the following terms: (Landforms) rift valley, karst, bog, peat, glacier, igneous, sedimentary, metamorphic, fiord, tarn; (Climate) air masses, North Atlantic Drift, range of temperature, fog, smog.

Problems and Projects

1. How do the British Isles compare in size with (a) Canada (b) your province?
2. Using the index to this book or a suitable reference book, find out where rift valleys are found in other parts of the world.
3. From an atlas or some other source book, find out which parts of Canada contain: (a) igneous rocks, (b) sedimentary rocks, (c) metamorphic rocks.
   Do the same for the British Isles.
4. Superimpose on a rough sketch map of Alberta, an outline of Great Britain using the same scale for both maps.
5. Compare the height of the highest mountain in the British Isles with that of Canada's highest mountain, Mt. Logan. Draw to scale a diagram which will show the comparative heights of these two mountains.
6. Name areas (a) in Canada (b) in the world, that receive heavy rainfall because of their location on the windward side of mountains.
7. Why has Canada more climatic zones than the British Isles?
8. Give several problems that would be created by fog and smog.

Maps

Under this heading in all of the Work Units you will find suggestions for maps that could be made for inclusion in your Geography notebook. Place your finished maps as close as possible to the written information corresponding to the material that you have marked on your map.

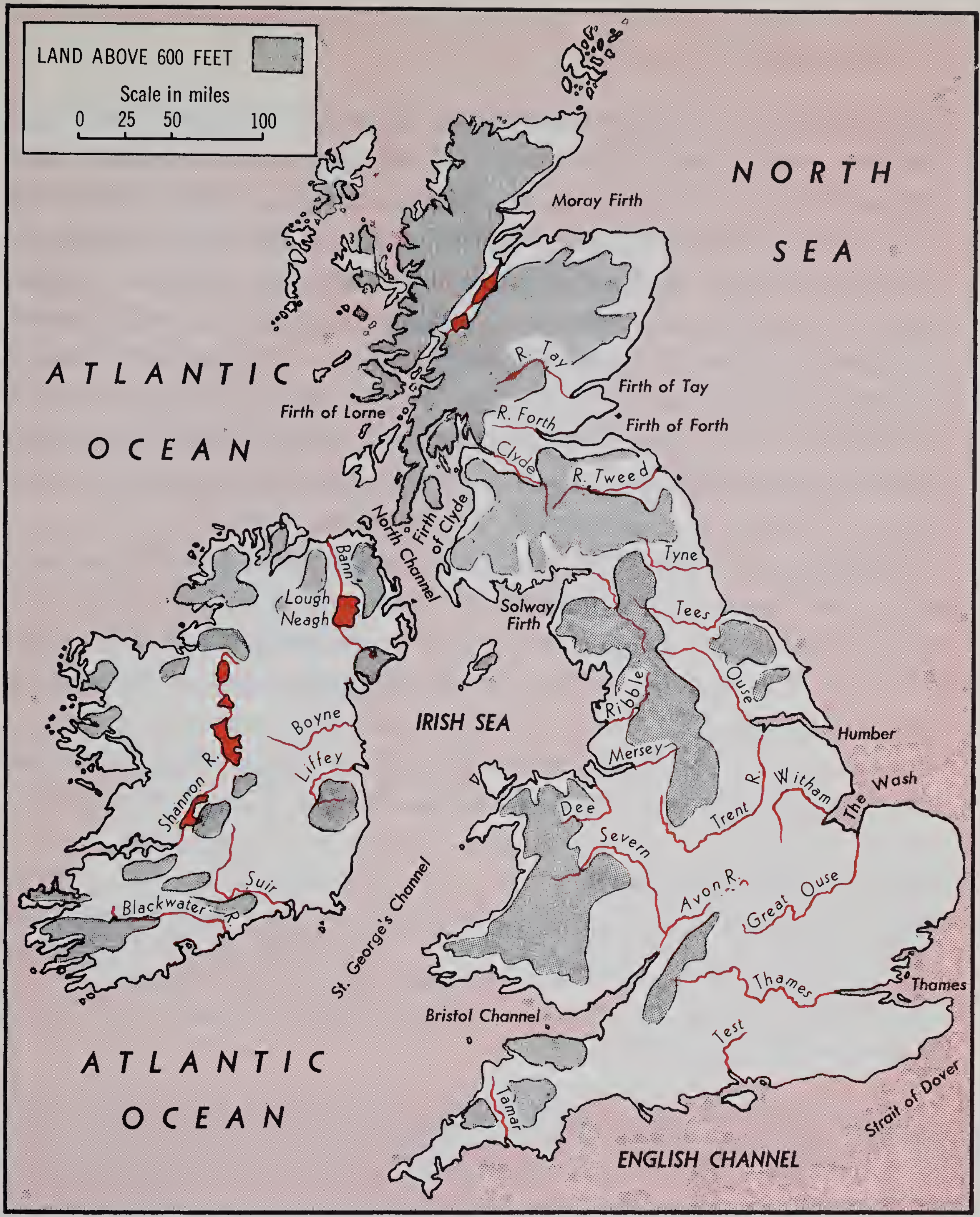
1. On outline maps of the British Isles mark:
   (a) the principal highlands and lowlands
   (b) the highest mountain peaks
   (c) the main coastal waters
   (d) the main political areas
   (e) the larger islands
2. Using either your text or an atlas, make and colour your own notebook map to show areas of:
   (a) heavy rainfall
   (b) moderate rainfall
   (c) light rainfall

RIVERS AND LAKES

The heavy, year-round rainfall of the British Isles creates numerous rivers which flow steadily to the seas. Most of them are less than 50 miles long and are so small that they cannot be navigated by large freighters or passenger ships. Since they flow across gently sloping plains for most of their lengths, they tend to be sluggish and, therefore, useless for the production of hydro-electricity (which requires rapidly flowing water to drive the generating equipment). Exceptions to this general rule occur in the highland areas of Scotland and Wales, where steep, rocky courses provide fast-flowing water and suitable sites for the construction of power dams and plants. Several of the larger lowland rivers of Scotland and England are used for navigation. By much dredging and the building of locks and connecting canals, several of these rivers have been made navigable for many miles inland. *Map 6*

The majority of the large English rivers flow to the east coast into the North Sea. The biggest, from north to south, are the Tweed, Tyne, Tees, Humber, Witham, Welland, Nene, Great Ouse, and Thames. The Humber is really just an estuary with several large tributaries, such as the Trent and the Ouse. The latter also has several large tributaries, including the Derwent, Aire, and Don Rivers.

Although the rivers flowing to the south and west coasts are generally small and of little value for commercial navigation, nevertheless, the mouths of many have been flooded by the sea to form excellent natural harbours, such as Plymouth Sound at the mouth of the Tamar, and Southampton Water at the mouth of the Test River. The larger English rivers flowing westward are, from north to south, the Ribble, Mersey, Dee, and Severn. The Mersey is by far the most important western river. Its estuary serves as the harbour for Liverpool, Britain's second most important port, and it has been canalized to form the Manchester Ship Canal — a very busy waterway serving the large cotton manufacturing region in and around the city of Manchester. The 210-mile Severn is Great Britain's longest river, but the Thames, which is the second longest *Fig. 7* (200 miles), is the most important. Its large estuary provides a


LAND ABOVE 600 FEET
Scale in miles
0
25
50
100
NORTH SEA
Moray Firth
ATLANTIC OCEAN
Firth of Lorne
R. Tay
Firth of Tay
R. Forth
Firth of Forth
Clyde
R. Tweed
Firth of Clyde
North Channel
Bann
Lough Neagh
Tyne
Solway Firth
Tees
Ouse
Ribble
Humber
IRISH SEA
Boyne
Liffey
Shannon R.
Mersey
R. Trent
Witham
The Wash
Dee
Severn
Avon R.
Great Ouse
Suir
Blackwater R.
St. George's Channel
Thames
Thames
Bristol Channel
Test
Tamar
Strait of Dover
ATLANTIC OCEAN
ENGLISH CHANNEL

Map 6. Drainage and Coastal Waters.

fine natural harbour for London — Britain's most important port, capital, and largest city.

The rivers of Scotland are small except in the Central Lowland. Here the Tay, the Forth, and the Clyde, although short, are wide and navigable for some distance inland. They are much used for commercial shipping, especially the Clyde which provides the large industrial city of Glasgow with easy access to the sea. The Highland rivers are practically useless for navigation, but, as was mentioned earlier, a few of them are used to produce hydro-electricity.

The rivers of the low-lying central plain of Ireland are sluggish, but pick up speed in the mountainous coastal areas before entering the sea. One-fifth of Ireland, including most of the central plain, is drained by the 250-mile Shannon River — the longest river in the British Isles. Like the smaller rivers of the central plain, it wanders through swamps and lakes until it nears the coast where greater slope increases its speed of flow. Hydro-electricity is produced on this lower section of the Shannon.

The principal value of British rivers is the use made of their estuaries. An *estuary* is the funnel-shaped mouth of a river where tides occur, causing salt water from the sea to mix with fresh water from the river. It is usually formed by the sinking of the coast area below sea level so that the sea has flooded the lower river valley. In Scotland, estuaries are called firths and in Ireland they are often called loughs. Estuaries make excellent harbours since they protect

Figure 7. Port of London.
This is part of the Royal Albert Dock, one of the many docks in the Thames Estuary. Ships from all parts of the world call here to unload raw materials and to load manufactured goods. A forest of massive cranes helps in this busy work. The giant floating crane at the left is capable of lifting 150 tons.

ships from large sea waves. The daily rise and fall of the sea, called tides, sweeps away the sand and mud brought down by the rivers and keeps the estuaries clear and deep for use as natural havens for ships. The mild winters of the British Isles prevent the clogging of these natural harbours by ice. Some of the most important English estuaries, and the ports they serve, are the Thames (port of London), the Mersey (the port of Liverpool), the Humber (port of Hull), and the Tyne (port of Newcastle). The most important Scottish estuaries are the Firth of Clyde (port of Glasgow), the Firth of Forth (port of Leith serving Edinburgh), and the Firth of Tay (port of Dundee). *Fig. 7*

Lakes The Lakes of the British Isles are small and unimportant by Canadian standards. Their values lie in their beauty and use for recreation and for the storage of water for either power production or city water supplies.

NATIVE PLANTS AND FORESTS

When the islands were first settled, deciduous forests dominated by oak, blanketed most of the lowland, and thin, coniferous forests of Scots Pine and Yew trees grew on the higher or sandy ground. Extensive marsh lands and open *moorland* interrupted the forests in sections not suited to tree growth. Desiring clear land for buildings, pasture, and cropland, and needing wood for fuel and timber, the settlers unwisely reduced the forests to the point where today trees occupy only a very small part of the total land area. *Fig. 8*

The heavily populated and industrialized British Isles consume large quantities of wood products, but since less than seven per cent of their total land area is in forest, only about one-tenth of Britain's requirements can be obtained from her own woodlands. Most of the shortage is made up by imports from Canada, Sweden, Finland, and the Soviet Union.

Centuries ago, much of Great Britain was covered with trees, but today large timber stands are found only in northern and eastern Scotland and in southeast England. Some of the mountain areas, especially the Scottish highlands, produce coniferous trees, such as native Scots Pine, together with Norway and Sitka Spruce from

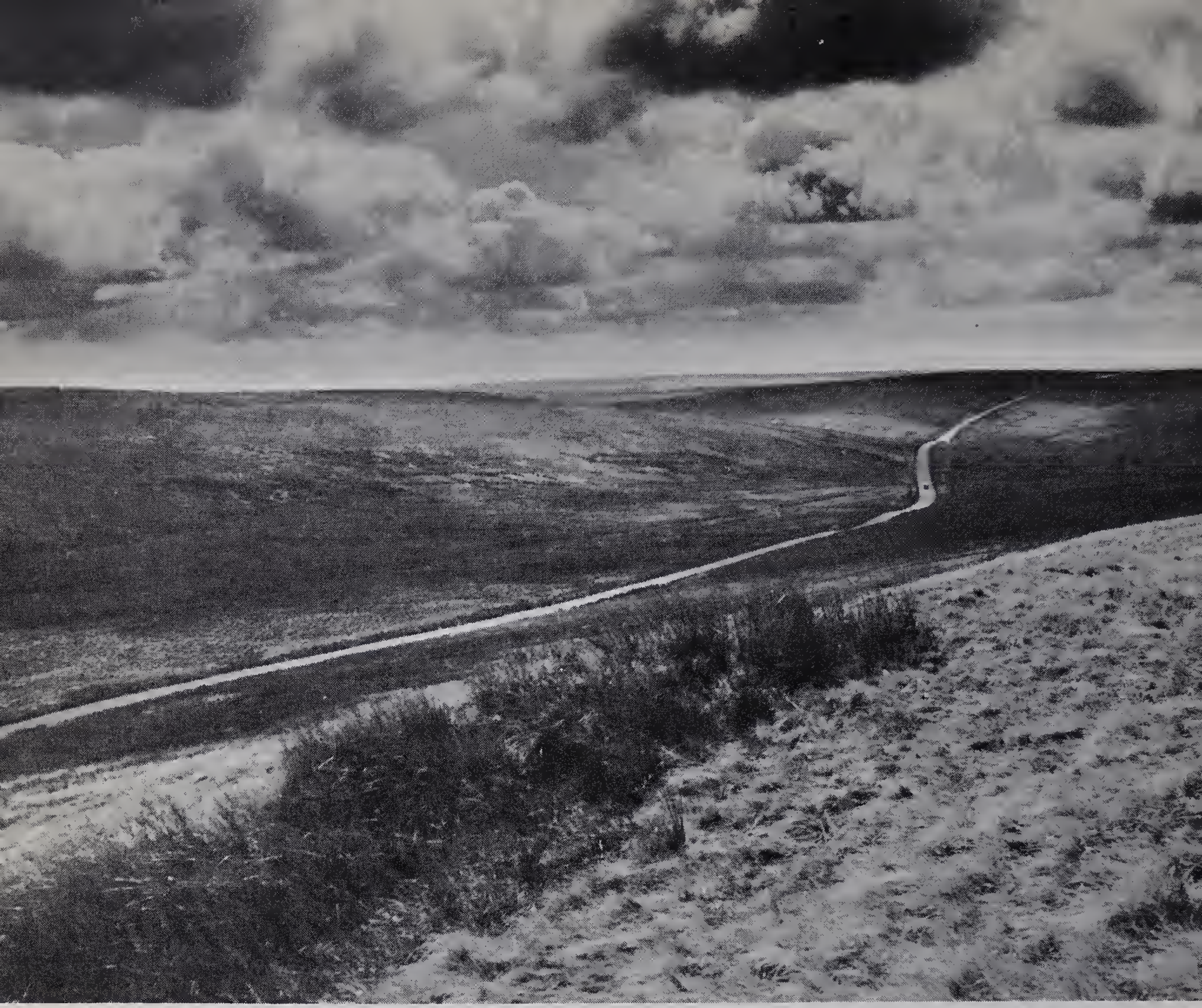


Figure 8. Typical British Moorland.
Excessive rainfall, cooler temperatures due to increased elevation, and poor soils create these treeless moors. Sparsely inhabited, they are utilized mainly for the grazing of sheep.

woodlands reforested with foreign species. Deciduous trees, of which the most important are oak, beech, and ash, grow on the suitable non-agricultural land of the English and Scottish plains.

The British Isles are an excellent example of an area that has destroyed too many of its trees and is now trying to recover lost *Fig. 9* ground through better forest management, including the introduction of superior, fast-growing foreign species. However, the high density of population and the need for living space limits the amount of land that can be returned to forest, so wood products will probably always be among the main British imports.

Animals The once abundant animal life of the British Isles has been disturbed by the dense population even more seriously than the forests. The brown bear, wolf, wild boar, elk, and beaver which once inhabited the islands disappeared centuries ago. Some larger mammals who survive in comparatively small numbers are the fox, badger, otter, wildcat, marten, weasel, and red deer. They are, of course, limited mainly to remote areas or game preserves,

Figure 9. A Reforestation Project.
Because the forests of the British Isles are limited, it is necessary to plant new trees to replace the ones that are cut each year. This is called "reforestation" and many such projects are being carried on. This one is in Scotland and the men are weeding year-old seedlings.

but rabbits are common throughout the islands. Rats and many other small animals that obtain an easy food supply from man, and whose natural enemies have been destroyed by civilization, are plentiful.

Ireland has no snakes, and Britain has just three varieties, of which the adder is the only poisonous variety.

In the same way that many mammals of the British Isles are well known to Canadians, so are many of the most numerous birds of the islands common in Canada. Good examples are finches, blackbirds, sparrows, robins, wrens, larks, and pigeons. Game birds still found are the pheasant and the red grouse. The latter is the only species peculiar to the British Isles.

SOILS

Highland Soils Several natural factors have combined to make the soils of the highlands generally thin and poor. Thousands of years ago, the great glaciers that covered all of the British Isles except the extreme southern part of England carried away loose materials, leaving many areas of bare, rocky surfaces which still remain today. Little new soil has been formed since the Ice Age because the old, hard rocks forming the uplands break down very slowly. The soil that has been formed is generally infertile because it is deficient in minerals necessary for healthy plant growth and in *humus*—the decaying remains of vegetable matter that is an essential ingredient of good soil. The coniferous trees that usually grow on the highlands do not shed their needles in Autumn and so provide only limited amounts of plant matter to form humus. The heavy rainfall received in the uplands carries this small quantity of humus, together with essential minerals, down into the ground beyond the reach of normal plant roots. Naturally the shallow, infertile soils of the highlands are unsuitable for crop cultivation. *Fig. 14*

Lowland Soils The lowland soils are much deeper and richer than the highland soils, but they are of only average fertility compared with the world's best soils, such as those found on the prairie wheatlands of Canada and the Soviet Union. As the glaciers of the Ice Age melted, a blanket of powdered rock, containing many stones, called *glacial drift* was deposited, especially on the plains. The upper layers of this blanket of drift gradually formed into soil. The drift on the plains provided more pulverized materials for good soil formation than highland drift because it contained rocks derived from the younger, softer lowland bedrock which broke down more easily than the older, harder rocks in the highland drift.

The falling leaves of the deciduous trees which grew on much of lowland Britain provided much more humus than the coniferous trees, and the reduced rainfall, especially in the drier parts of Great Britain and Ireland, reduced the loss of important minerals and humus. *Fig. 10*

Although deeper and richer than the highland soils, the soils of lowland Britain require expert care and the regular addition of fertilizers if they are to maintain their fertility. In this and other respects they are similar to the soils of Southern Ontario. Fortunately, the excellence of British education produces farmers trained in proper soil management, and the generally high standard of living in lowland Britain provides enough money to buy artificial fertilizers to supplement the use of animal manures.

WORK UNIT 2

The Language of Geography Add to your reference list, definitions of the following terms: (Rivers and Lakes) estuary, firth, lough; (Vegetation) reforestation, coniferous trees, moors, peat; (Soils) humus, glacial drift.

Problems and Projects

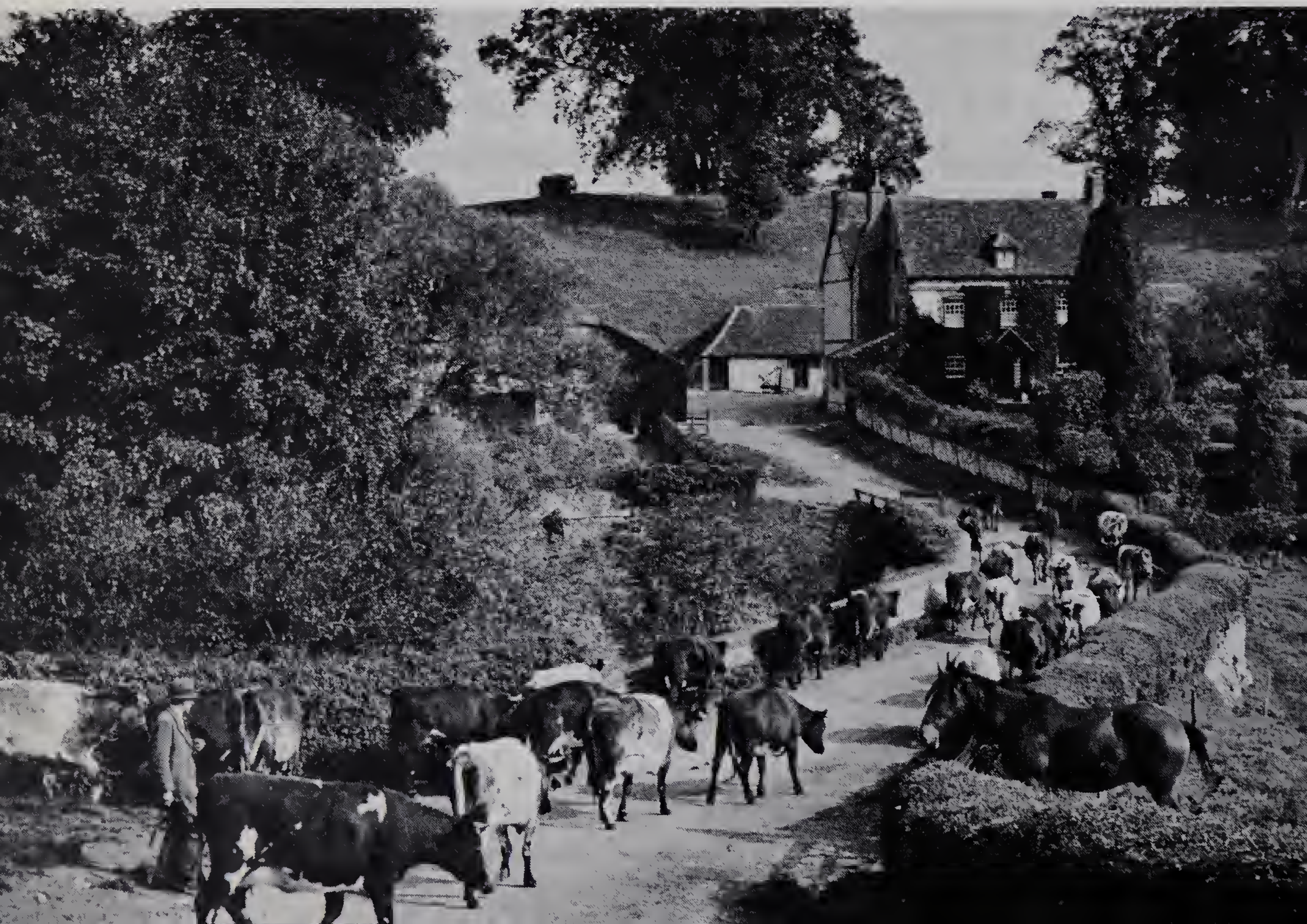
1. Compare the Thames River with the St. Lawrence River under the following headings: (a) length, (b) navigation, (c) importance for trading, (d) hydro-electric developments, (e) effect upon population density.
2. Prepare a bar graph to show how the value of forest products produced in the United Kingdom compares with the value of forest products produced in Canada, United States, the Soviet Union, and Sweden.

3. What rivers in your province are similar to those of (a) lowland Britain and (b) the highlands of Scotland and Wales?
4. Suggest reasons why the trees and animals of Canada are similar to those across the Atlantic.
5. Why does Canada have a higher percentage of forest cover than the British Isles?
6. Are the soils of your community similar to those of the highlands or those of the lowlands of Britain?
7. Why is there not an important fur industry in Britain?
8. How does the Shannon River of Ireland differ in nature and use from the Clyde River of Scotland?
9. Investigate and describe any reforestation projects being carried out in your province that are similar to those in the British Isles.

Maps

1. On outline maps of the British Isles mark:
    (a) the most valuable rivers
    (b) the chief canals

Figure 10. An English Farm.
This is a dairy farm in Southern England. Most of the products from this and nearby farms are shipped to London.



AGRICULTURE

THE UNITED KINGDOM

Although the United Kingdom can produce only half the food needed by its large population, and must import vast quantities of agricultural raw materials for her manufacturing activities, farming is still an important industry. It engages one million people, or over four per cent of the working force, and uses five-sixths of the land. Scientific farming methods, with wide use of machinery, applied to fertile lowlands under favourable climatic conditions produce enough food to feed the entire Canadian population with plenty to spare. It is the shortage of land and dense population, not the quality of British farming, that explains the agricultural shortages. Yields per acre are among the highest in the world and Britain is famous for its fine pedigree sheep, beef cattle, and dairy cattle. *Fig. 11*

Agriculture in Britain usually takes the form of mixed farming with the main emphasis on livestock and livestock products. Cattle kept for both meat and dairy products dominate the livestock field, but sheep and pigs are also raised in large numbers. Great quantities of vegetables are grown both for the large urban markets and for animal fodder. In some favoured areas, grain crops are important, but only as part of a mixed-farming economy and not as the basic crop as in the Canadian prairies. Eggs and poultry are produced on most farms and there are many special poultry farms. In general, wheat and fine barley are stressed in the drier east, cattle in the wetter western lowlands, and sheep in the rugged uplands. Market gardening thrives close to urban markets when favourable climate and suitable light soils are available.

Most British farms are operated by individual farmers and their families as private businesses, but less than two-fifths of the farms are owned outright by the farmers themselves. Three-fifths of the farms are under 50 acres and less than one-fifth are over 100 acres. Mechanization is greatly advanced, with Britain having the highest tractor density in the world—one tractor per 40 acres of arable land. Combines are commonplace in the main grain areas.

Crops The chief crop is wheat, followed by barley, oats, potatoes, fruits, and other vegetables.

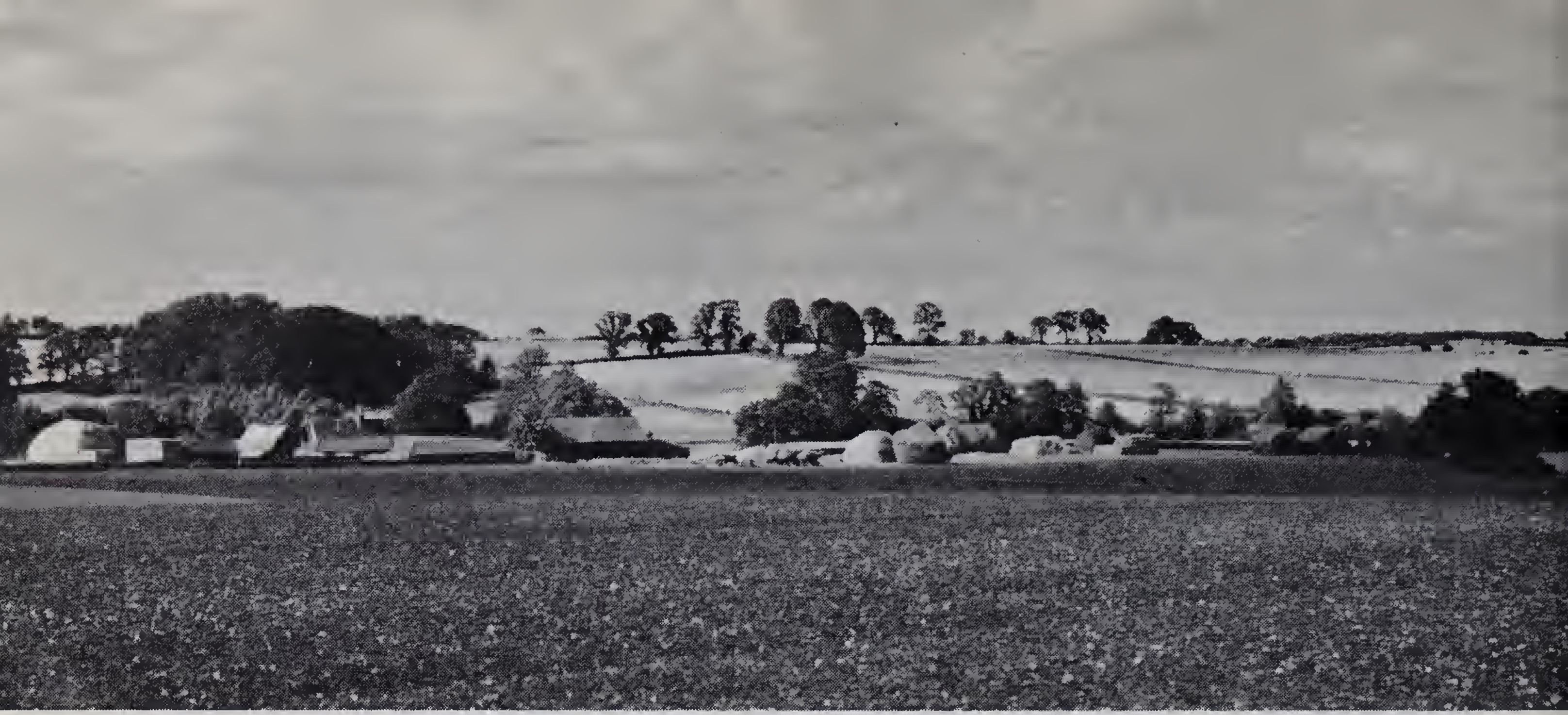
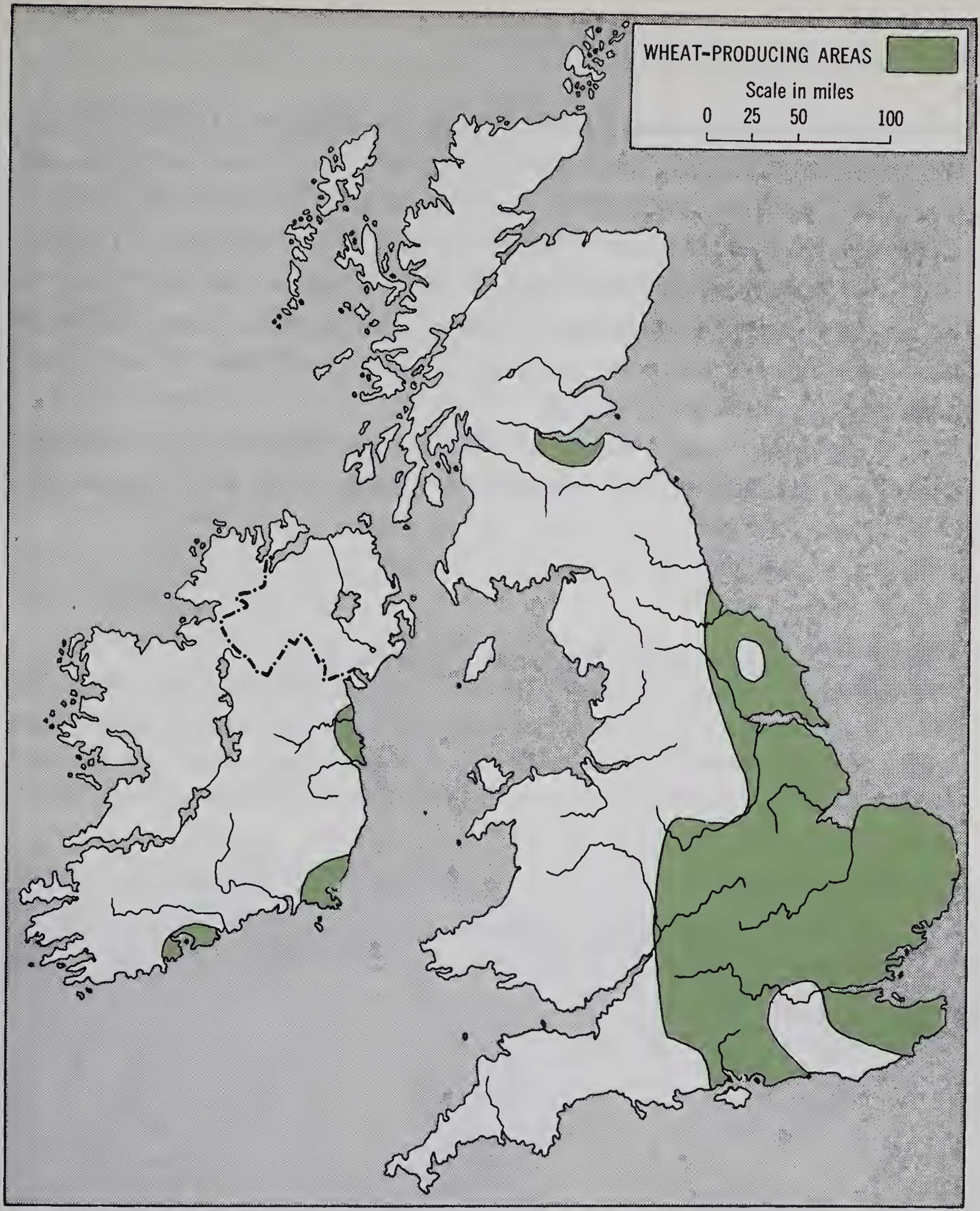


Figure 11. A Typical English Lowland Farm.
This farm in Suffolk nestles in the gently rolling land typical of this region. The fields are divided by hedges and deciduous trees. Scientific, mechanized farming and good soil management ensure a high yield per acre from farms like this.

Map 7 *Wheat* — Certain conditions must be present for wheat to thrive in an area. The soil should be heavy, and while annual rainfall must not exceed 30 inches, it must be sufficient in the early stages of growth to provide moist weather. In the early stages the weather must be cool but should be followed by a warm, dry, sunny period to ripen the wheat and allow for harvesting. The land should be level or only gently rolling to make cultivation easier and to allow for the use of labour-saving machinery. These ideal conditions are found only in the Midland Plain and in southeastern England. However, wheat is also grown under less favourable conditions in the east as far north as the Central Lowlands of Scotland where the only important wheat-growing area is south of the Firth of Forth.

Although yields average 32 bushels to the acre, compared to only 18 bushels to the acre in Canada, British wheat is of the soft variety which is unsuitable for making bread unless it is mixed with other harder varieties. Britain's wheat production falls far short of her needs, and she must import large quantities, which include much fine quality, hard Canadian wheat.

Wales, Ireland, and western England are too wet to grow good crops of wheat and most of Scotland is too cold.



Map 7. Main Wheat-Producing Areas.

Barley — Barley thrives under the same conditions as wheat, but will also grow in colder areas. Only the extreme north of Scotland is too cold for barley. Although barley is raised on farms throughout the rest of Britain for animal feed, the most significant barley crop is an expensive, high grade variety grown in Eastern England to make malt which is used in the brewing of beer and the distilling of whisky.

Oats — Oats is the hardiest crop, being able to thrive in either dry or wet areas and in temperatures too low for most other grains. It, therefore, can be successfully cultivated in Wales and the West of England with their damp climate and in cool northeast Ireland. Oats are grown throughout Britain and constitute the main crop of Scotland where it is generally too cool and wet for wheat. Its main use is as feed for animals, but some of it is made into oatmeal used in breakfast foods and baking.

Vegetables and Fruits — Britain produces large amounts of vegetables and fruits—enough to supply over four-fifths of its

Figure 12. Apple and Cherry Orchards in Kent.
The county of Kent, situated just south of London, is often called the "Garden of England". Every morning through the year, trucks laden with fruit and vegetables go from the farms of Kent to the markets of London. The circular buildings with cone-shaped roofs are oast houses, used to treat the hops grown in this area.

vegetable needs and half of its fruit requirements. Market gardening thrives close to cities and towns when soil and climate are favourable. Although removed from large cities, the mild climate of the Channel Islands and the southwest peninsula of England give these areas an early start at vegetable production, and good transportation facilities enable them to capture the early vegetable market in many of the large cities.

The lowlands of eastern England, especially the Eastern Plain and the Fen district, are the chief sources of potatoes, sugar beets, and other vegetables where they are grown in rotation with other crops. The Fen district is an exceptionally fertile area of former marshland, now drained by pumps into a network of canals that empty into the rivers crossing the area.

Apples, plums, pears, and other orchard fruits grow abundantly south of the Thames Estuary, in the counties of the lower Severn, and south of the Bristol Channel. Strawberries, raspberries, gooseberries, currants, and other small fruits thrive in the land to the north and south of the Thames estuary. The county of Kent in south-east England is the main fruit-growing area and is also noted for hops, a climbing plant that produces a cone-shaped fruit used to flavour beer. *Fig. 12*

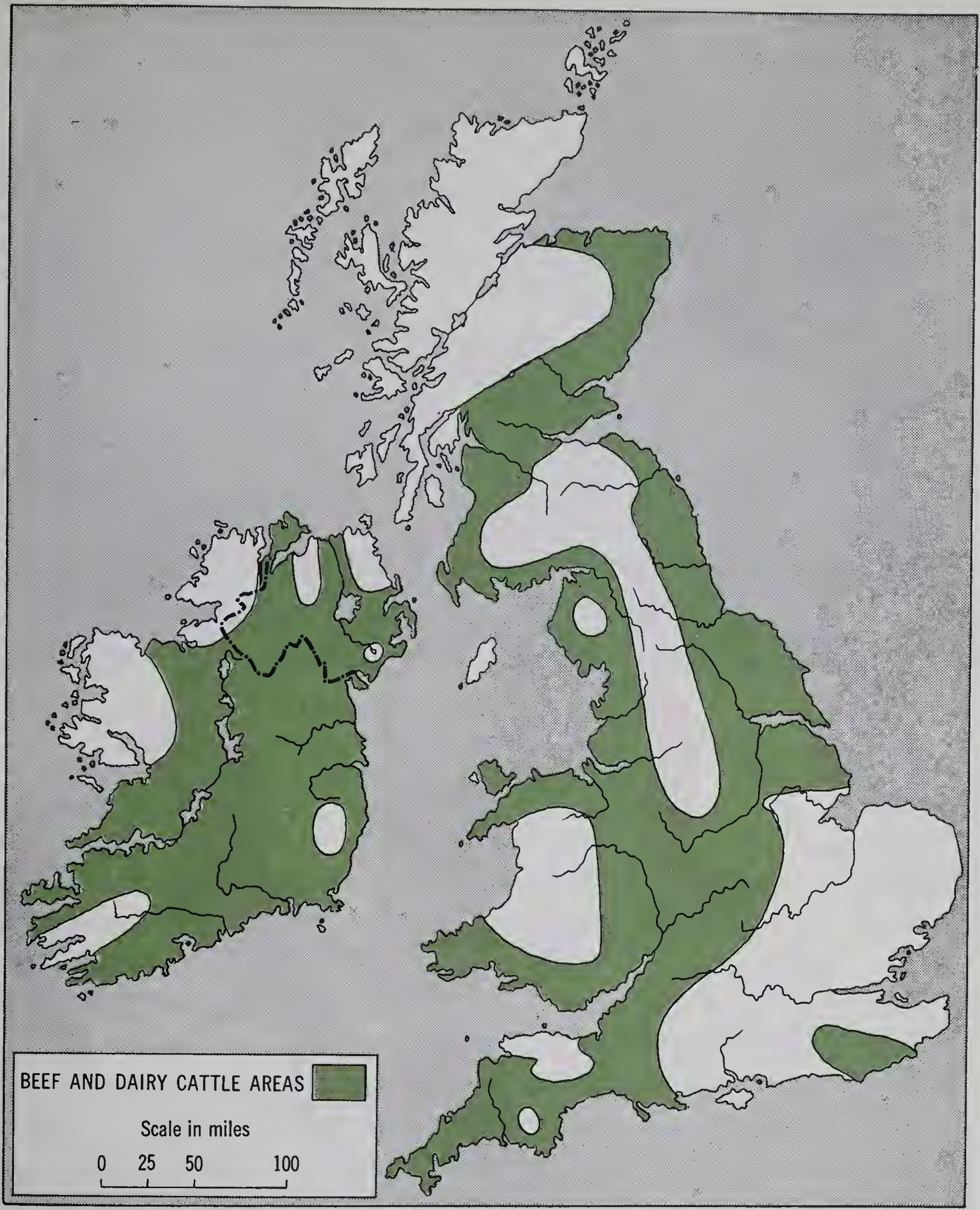
Livestock *Cattle* — British cattle are raised for meat and dairy products—both of which are very important in a land with so many people to be fed. Breeding methods are so excellent that there is world demand for British-bred cattle with many being exported at high prices. Aberdeen Angus, Shorthorn, Ayrshire, Guernsey, and Jersey are breeds famous throughout the world and are among the most popular in Canadian herds. The combination of good breeding, excellent pastures, and expert care results in milk and beef yields per animal that rank among the highest in the world. *Fig. 13*

During winter the grass stops growing in most areas, so the cattle must be fed hay, grains, or root crops. Much of Britain's agricultural land is used to produce such fodder crops.

Map 8 The chief stock-rearing regions are located in the Midland Plain and on the Lancashire and Cheshire Plain of England; on the western half of the Central Lowland of Scotland; and on the coastal lowland of southern Wales. In these areas,. the mild, wet climate encourages the growth of grass and crops like oats, hay, mangolds, and turnips which are fed to livestock. In more remote areas, the farmers convert their milk into butter and cheese, though beef cattle are often important in these areas and actually outnumber dairy cattle for the country as a whole. Where access to cities and towns is easy, fresh milk is the chief source of income. The vast metropolis of London, which lies outside of the chief stock-rearing regions, gets its milk supply from neighbouring rural areas and a dairying region on the nearby southeast coast.

Sheep — Unlike cattle, sheep do not require good pasture on

Figure 13. A Cattle Round Up in the Highlands of Scotland. *The rugged, treeless nature of this region makes it unsuitable for cultivation, but beef cattle thrive on the coarse grass which covers it. Many breeds of beef cattle now found on Canadian farms were developed in this region.*

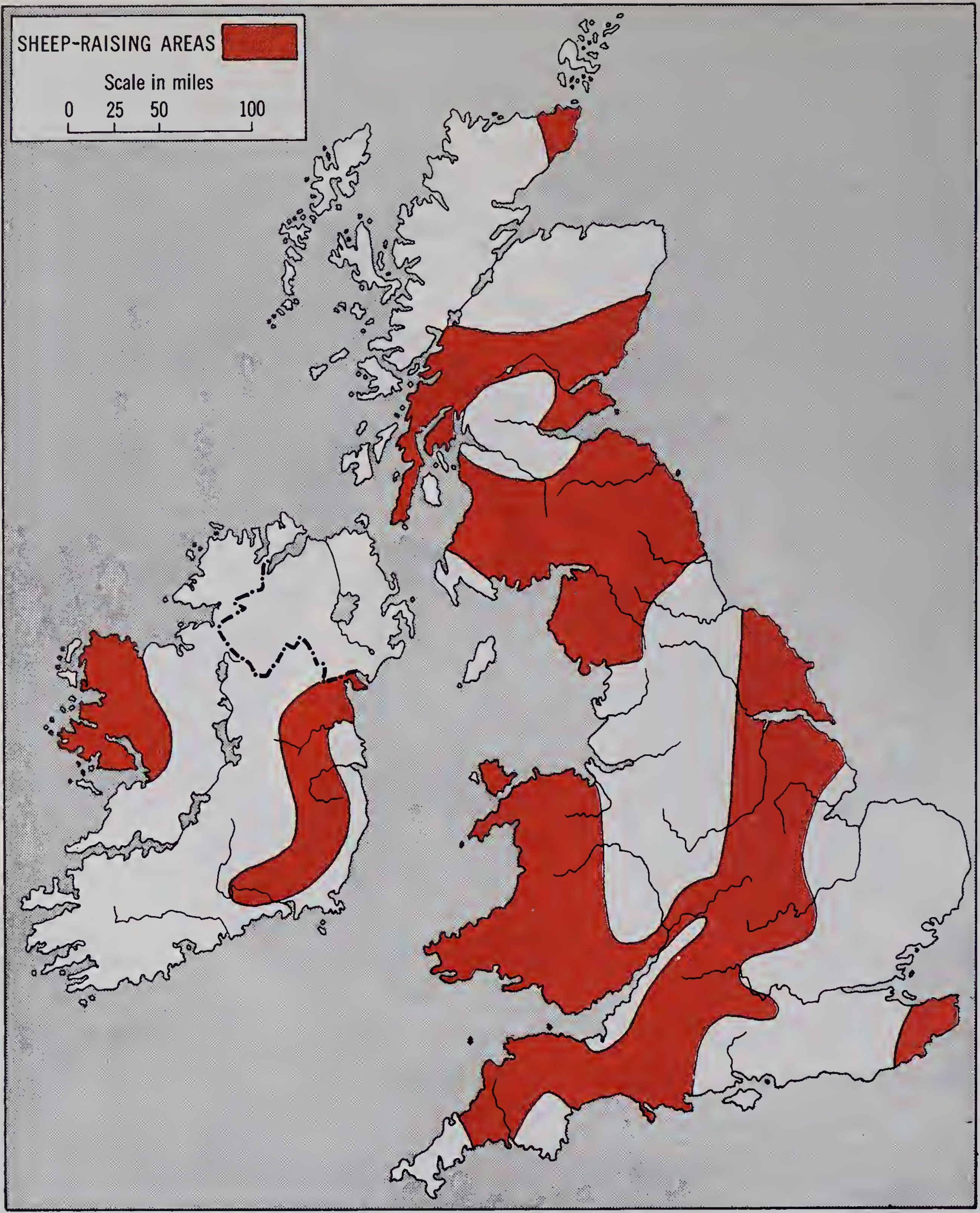

BEEF AND DAIRY CATTLE AREAS
Scale in miles
0 25 50 100

Map 8. Main Beef and Dairy Cattle Areas.

fairly level ground, but prosper on well-drained, hilly pastures. The major sheep-raising areas of the United Kingdom, therefore, are in the highland regions where the soil is poor and otherwise useless, but is capable of supporting sheep. The Scottish Highlands are so rugged that even the sheep population is sparse, but the Southern Uplands of Scotland, the Welsh Uplands, the uplands of Northern Ireland,

Fig. 14

Map 9


SHEEP-RAISING AREAS 🟥
Scale in miles
0
25
50
100

Map 9. Main Sheep-Raising Areas.

and the Pennines, Lake District, and Southwest Uplands of England provide pastures for millions of sheep. The cropland farmers of lowland Britain buy young sheep from the highlands and fatten them for market on the root crops and clovers which they grow in a rotation system designed to allow their land to revive between more demanding grain crops.

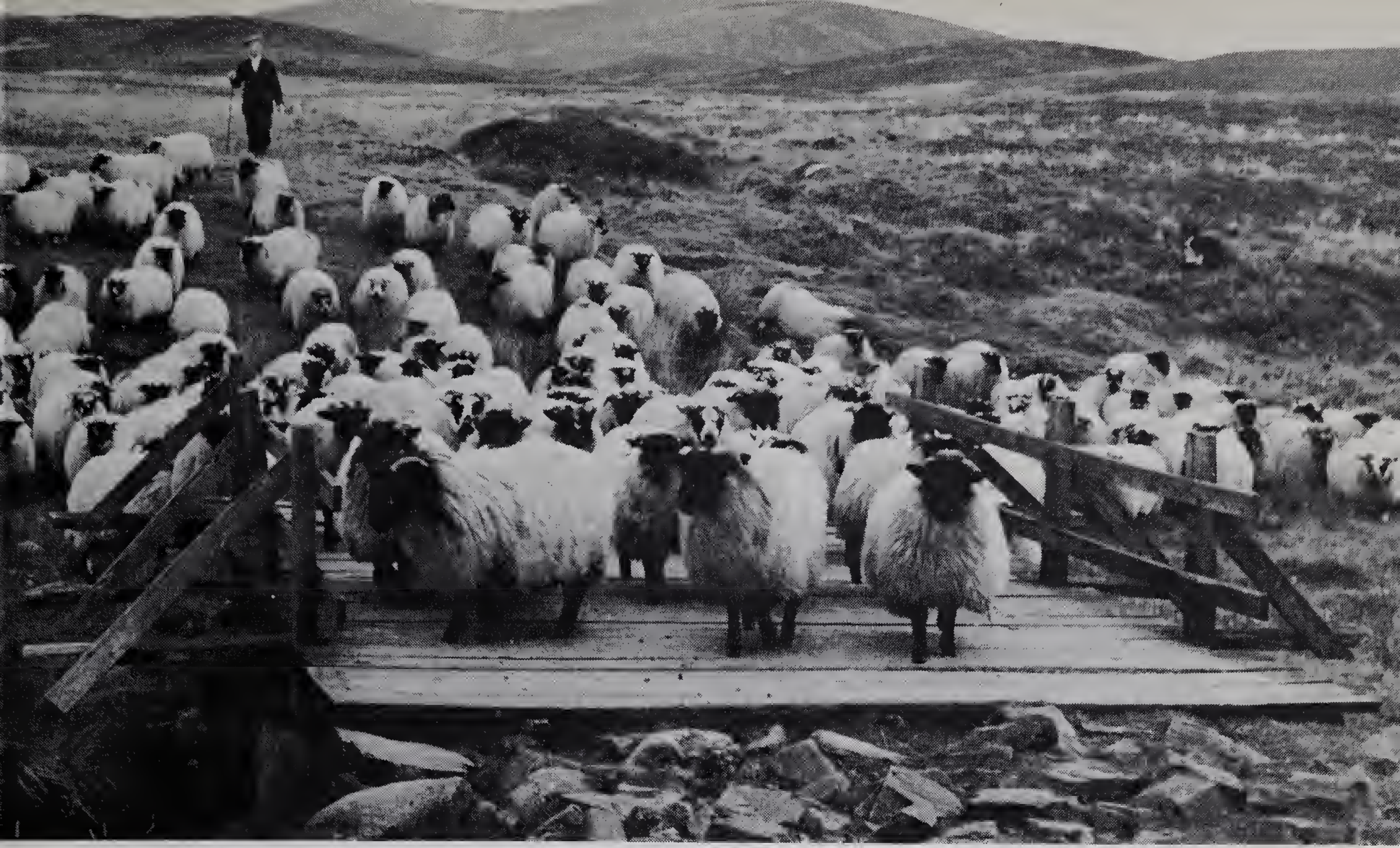


Figure 14. A Shepherd and His Flock.
This Scottish farmer and his sheepdog are driving some of his sheep across the highlands to warmer country for the winter. The barren treeless land of this region is suitable only for grazing sheep.

Britain has produced several famous breeds of sheep, especially the Romneys, Southdowns, and Leicesters, and only New Zealand and Uruguay have a denser sheep population than Britain.

The millions of sheep and cattle raised in Britain do not satisfy home needs; the wool requirements of the huge textile industry, and the need for more food make necessary large imports of wool, mutton, beef, and dairy products.

United Kingdom sheep provide only one-tenth of the raw wool used by the British textile industry; the rest is imported, chiefly from Australia, New Zealand, South Africa, and Argentina. Canada is the largest single market for British woollen exports, which include blankets, carpets, and other finished goods, along with yarns.

Pigs — England and Wales produce the majority of Britain's pigs, but they are also raised in considerable numbers in Scotland and Northern Ireland. The pig population varies greatly according to the current price of pork. Although pigs are common on most lowland farms, there is a greater emphasis on their production in dairying and potato-growing regions because skim milk and unsaleable potatoes make excellent food for pigs.

Poultry — Britain's farmers raise tens of millions of poultry both on special poultry farms and on regular farms to meet the heavy demand for eggs and fowl in the large urban areas.

THE REPUBLIC OF IRELAND

Long range changes in the climate of Ireland have had disastrous effects upon its agriculture. When cool temperatures, extreme cloudiness, and heavy rainfall occur for long periods they make the growing of many crops impossible. This caused much misery in Ireland in the 19th century. During the late 18th and 19th centuries, the introduction of the potato and a 100-year period of good climatic conditions had allowed Ireland to switch its agricultural emphasis from the keeping of cattle to crop farming, with great dependence upon the potato crop. The increased production of the new system allowed the population to rise from 1½ to 8 millions. Then disaster struck in the form of cooler, cloudier climatic conditions. Great suffering and mass emigration finally brought about a sharp reduction in population and the return of farmers to cattle as the mainstay of agriculture with the potato taking a secondary role.

Most of the cattle are grazed on the grassy Central Plain with dairying very important near Dublin, the capital. Cattle, shipped to Britain for fattening and slaughter, form a major part of the country's exports.

Landholding practices and farm sizes are very similar to those in Britain with a mixture of tenant and owner-operated farms and only six per cent of the farms over 100 acres in size. However, the place of agriculture in the economy of the country is very different. Manufacturing dominates the British economy and less than one-twentieth of the people are engaged in agriculture, while in Ireland, agriculture is the main industry and it supports nearly half the population. Another notable difference is the degree of mechanization. In Ireland much farm work is still done with the aid of horses, in contrast to the heavy use of tractors in Britain.

Some wheat and barley are grown on the arable lands of the drier, sunnier southeast, but the cool, moist climate experienced in most of Ireland dictates that oats must be the main grain crop. Potatoes, the staple food crop, still occupies a large acreage. Mangolds, turnips, oats and other crops are raised for animal feed in both the North and the South. Flax is grown in the north. Sheep are reared in the highlands of the coastal regions, and poultry and pigs are kept on the many small farms.

FISHERIES

Britain's inability to raise enough food to feed its large population adds importance to the shallow seas surrounding the British Isles. Usually less than 300 feet deep, these waters provide excellent fishing grounds as well as breeding grounds for fish. The mixing of cold and warm ocean currents near the shores of the British Isles provides the most suitable temperatures for large schools of commercial fish. The best fishing area is the *Dogger Bank* located in the midst of the North Sea about 100 miles east of England. Here millions of fish feed on abundant minute organisms called plankton and fishing is made comparatively easy by the level bottom and shallow water. Secondary areas, like the Irish Sea and the coastal channels, have deeper water and more uneven floors so are not as ideal for fishing as the North Sea. The east coast of Great Britain, therefore, dominates the fishing industry. Many British fishing vessels go as far as the Bay of Biscay or the coasts of Iceland, Greenland, and Norway to fish. Involving fewer ships but much greater distances are the factory ships which travel to the Antarctic seas to catch whales. *Map 2*

British fisheries can be separated into two divisions (1) catching the bottom feeders such as cod, haddock, plaice, and sole, and (2) catching the surface feeders such as herring, pilchard, and mackerel. Trawling and lining are used to catch the bottom feeders which outrank the surface feeders in importance. In trawling, a funnel-shaped net of heavy twine is towed along the sea bottom, while in lining, long lines with many baited hooks attached at regular intervals are spread over large areas. The surface feeders are best caught by seining or drifting. In seining, a large funnel-shaped net is pulled *Fig. 15*

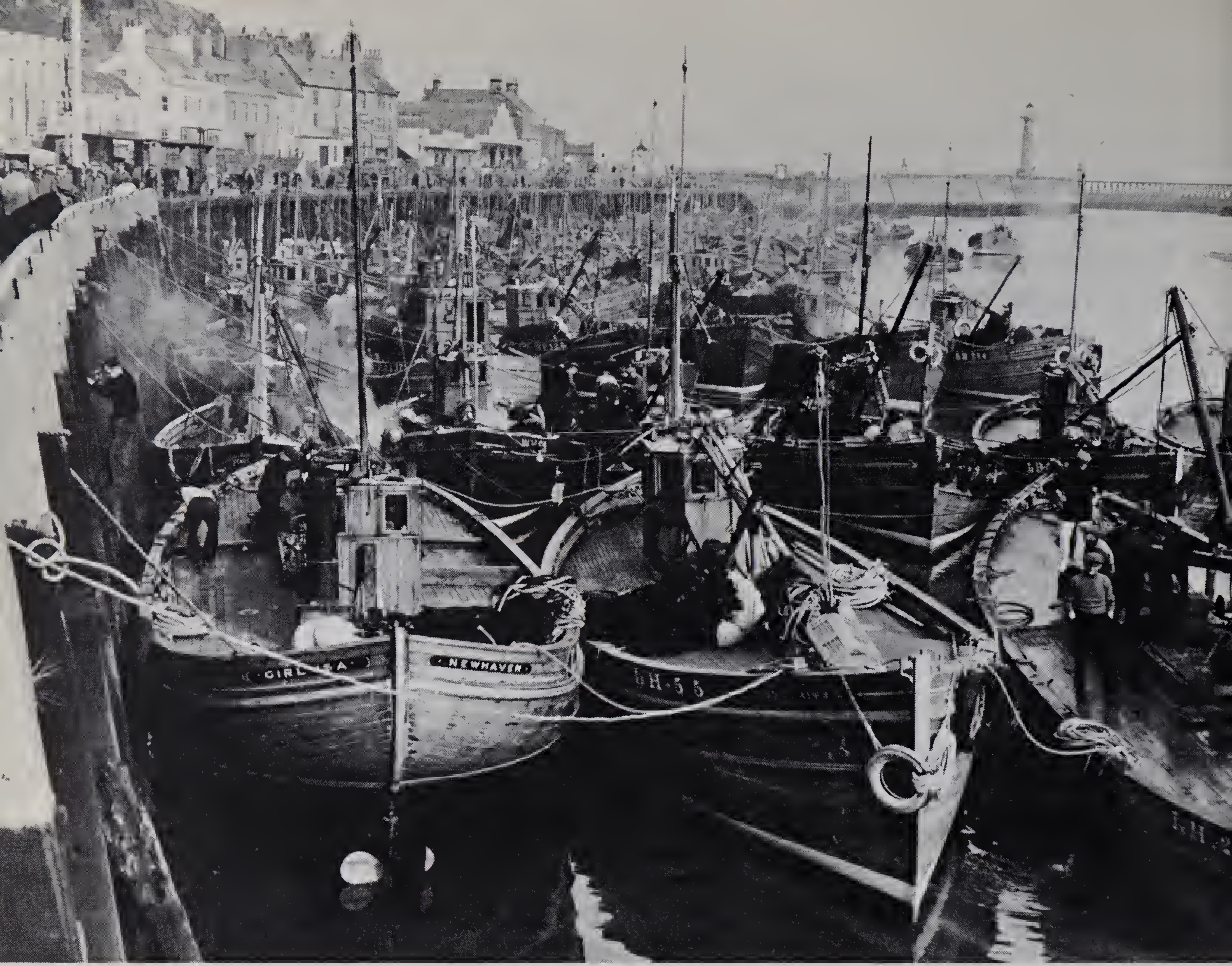


Figure 15. Herring Boats at an East Coast Fishing Port. *This fleet of herring boats is waiting in Whitby harbour for the night tide. The boats, while small, are sturdy and are designed to withstand the rough weather of the North Sea. The distance of the boats below dock-level indicates that the picture was taken at low tide.*

slowly towards the ship, while in drifting, the fish swim into a finely meshed net placed in a vertical position and are caught by their gills.

Although the British people consume large amounts of fish, the British fishing fleet is so efficient and the fishing grounds so excellent that it takes fewer than a thousand vessels and thirty thousand fishermen to meet the demand. Much of the fishing is seasonal because the fish migrate when the waters become colder.

Valued at $100 million, the British fish catch is second in value and sixth in quantity for the world. Consisting mainly of cod, haddock, plaice, and herring, some of the catch is salted or frozen and exported in considerable quantities to Europe and the West Indies and in lesser amounts to other areas. Fish that are not found in large numbers near the British Isles are imported. For example, the British buy canned salmon from Canada's west coast.

Oysters, crabs, lobsters, and other sea-food, along with trout, salmon, eel, and others caught in fresh water account for one-tenth of the total value of the British catch. Many by-products are obtained from the fish caught: fish meal for animal food and fertilizers, vitamin oil from fish livers, soap and margarine from whale oil, and many others ranging from buttons to perfume.

As would be expected, the main fishing ports for the British Isles are those nearest the North Sea. These include Aberdeen, Hull, Grimsby, Yarmouth, and Lowestoft. The only major fishing port not on the east coast is Fleetwood on the English coast of the Irish Sea.

WORK UNIT 3

The Language of Geography Add to your reference list definitions of the following terms: (Agriculture) yield per acre, mixed farming, animal fodder, malt, market gardening, hops, rotation system; (Fisheries) Dogger Bank, plankton, bottom feeders, surface feeders, trawling, lining, seining, drifting.

Problems and Projects

1. How do British farms compare in size to those in Canada?
2. Where does Britain stand in the world production of (a) wheat (b) barley (c) oats (d) cattle, and (e) sheep?
3. What do the Holland Marsh area of Ontario and the Fens district of England have in common?
4. Compare the conditions which favour fruit-growing in the Niagara fruit belt of Ontario with the conditions that are found in the county of Kent, England.
5. What fish that are common on the Dogger Banks are also numerous on the Grand Banks off eastern Canada?
6. British farms are very efficient and productive. Why then does Britain produce only one-half of its food needs?
7. What conditions which favour the growing of wheat on the Canadian prairies are also found in Eastern England?

8. Prepare a bar graph to show the size of fish catches off (a) the British coasts, (b) the east coast of North America, (c) the west coast of North America, and (d) the coasts of Japan.
9. What breeds of British sheep, cattle and horses are common on Canadian farms?

Maps

1. Using either the text or an atlas, mark on outline maps of the British Isles the areas that are important for (a) wheat, (b) cattle, and (c) sheep.
2. Draw a map of the North Atlantic Ocean and indicate on it the location of the major fishing areas used by British fishing vessels.

A small fishing town in the south of England.
This scene on the sea shore at Hastings, with fishermen inspecting their nets, is typical of the smaller ports in Britain. Many of these towns are very old; houses have been built at different times over the centuries, resulting in a fascinating jumble of sizes, styles, and materials.

MINERAL AND POWER RESOURCES

Minerals *Coal* — Coal provides over four-fifths of all the power produced and nine-tenths of the value of all minerals mined in the British Isles. Since Britain is primarily an industrial nation with huge power requirements and is poorly endowed with the other major sources of power—oil, natural gas, and running water—coal is the very foundation of the British economy. Not only does coal supply power for industrial plants, electric generating stations, trains, and ships, but the many products which result when it is strongly heated provide valuable raw materials for industry. Intense heat separates coal-gas, tar, and other liquids from coal, leaving behind a hard, porous substance called coke that is used in the smelting of metal ores. The most vital use of coke is in the steel industry where it is burned in blast furnaces with iron ore to produce iron and steel. In addition to heating and its other common uses, coal-gas can be made to yield ammonia which is then used to produce ammonium sulphate, the most popular of all fertilizers. Many industries use sulphuric acid manufactured with the use of sulphur derived from coal gas. Chemicals for the photographic industry, drugs, dyes, and some of the ingredients of plastics are procured from coal tar.

Fig. 19

ranks 3rd

Britain annually mines one-sixth of the world's coal supply; her production is surpassed only by the United States and the Soviet Union. The major fields are all in Great Britain, Ireland's production being so limited that coal must be imported.

ethod

Where the seams reach the surface, the coal is mined by open-pit mining in which giant shovels, working in great holes open to the skies, scoop up the coal. However, most coal mined in Britain must be obtained by deep mining in which shafts are dug into the ground to reach the layers of coal often hundreds of feet below the surface. Underground tunnels stretch out from the pit shaft to the coal face. Here miners cut and load the coal into small trains which carry it to the shaft. Elevators then lift it to the surface where dirt and stones are removed and the coal is sorted according to size.

Fig. 16

While the most accessible deposits were being worked, and before Britain's own needs caught up with production, coal accounted for

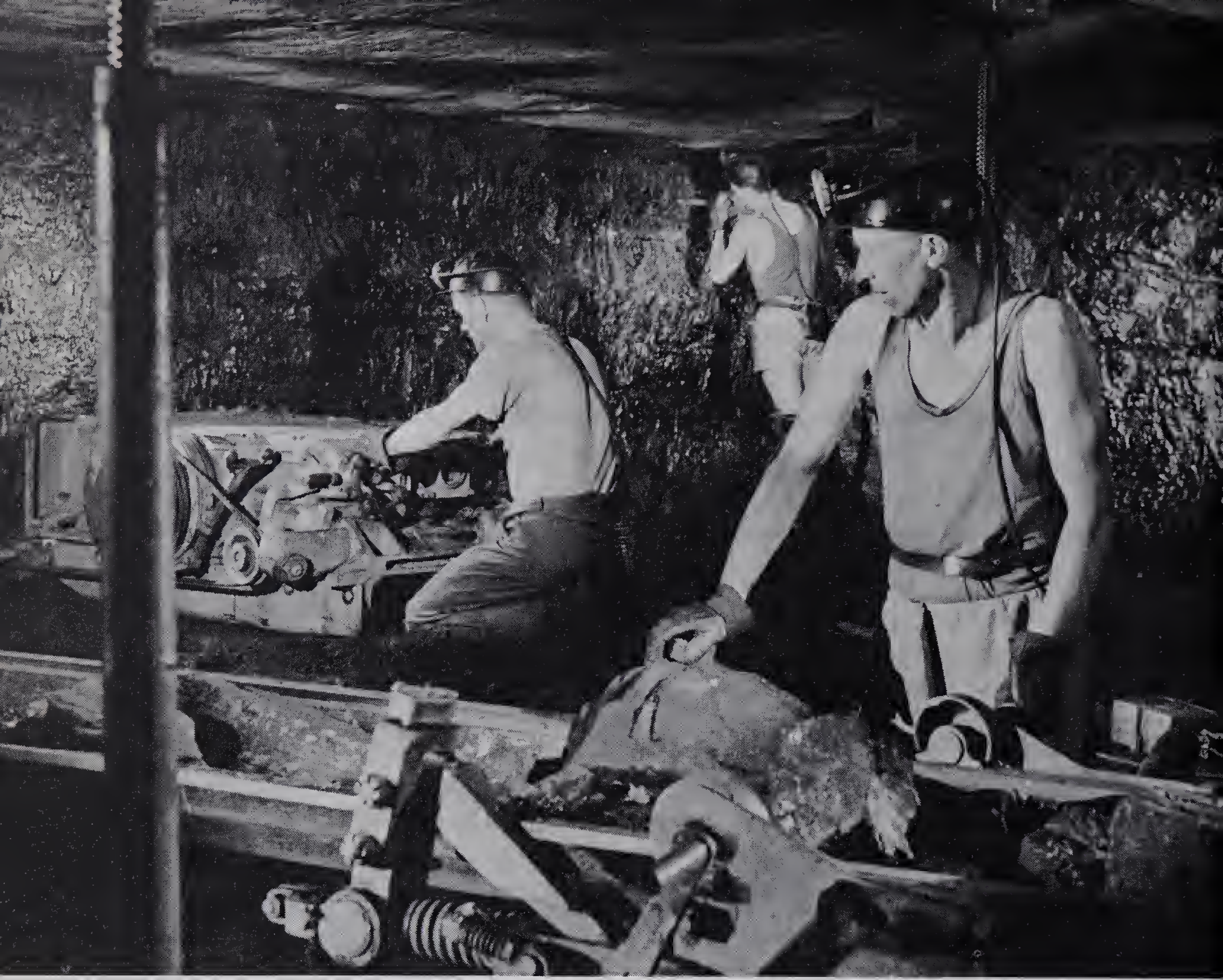


Figure 16. At the Coalface in a British Mine.
This picture shows two modern methods of obtaining coal quickly, a mechanical cutter and a belt conveyor. This type of mechanization has increased output while reducing the number of men working in the mines. It has transformed the old pick-and-shovel miners into skilled mechanics.

up to one-third of total exports, but now only a few million tons can be shipped out of the country. Although still producing over 200 million tons of coal a year and employing 700,000 men, the British coal industry faces serious problems. The thicker seams and those close to the surface have been almost worked out. Now miners must go deeper and must work on thinner seams or in areas where large movements in the earth's crust have tilted or broken the continuity of seams. These factors, of course, add to the danger and cost of mining. To help overcome these problems, more modern mining methods, including the use of up-to-date machinery, have been introduced. Now practically all the coal is mechanically cut and conveyed, and power loading machinery is being rapidly introduced. However, shaft mining, with its low, narrow tunnels makes the increased use of machinery difficult.

The main coalfields are (1) the Yorkshire, Derbyshire, and Nottingham field on the flanks of the Pennines, which produces about two-fifths of total output; (2) the Northumberland and Durham field, which produces excellent coking coal; and (3) South Wales, which produces fine anthracite. Also important, but of secondary rank, are the coal fields of the Central Lowlands of Scotland, of Cumberland, and of Lancashire and the West Midlands. Leading industrial districts have developed near all of the major coalfields. *Map 10*

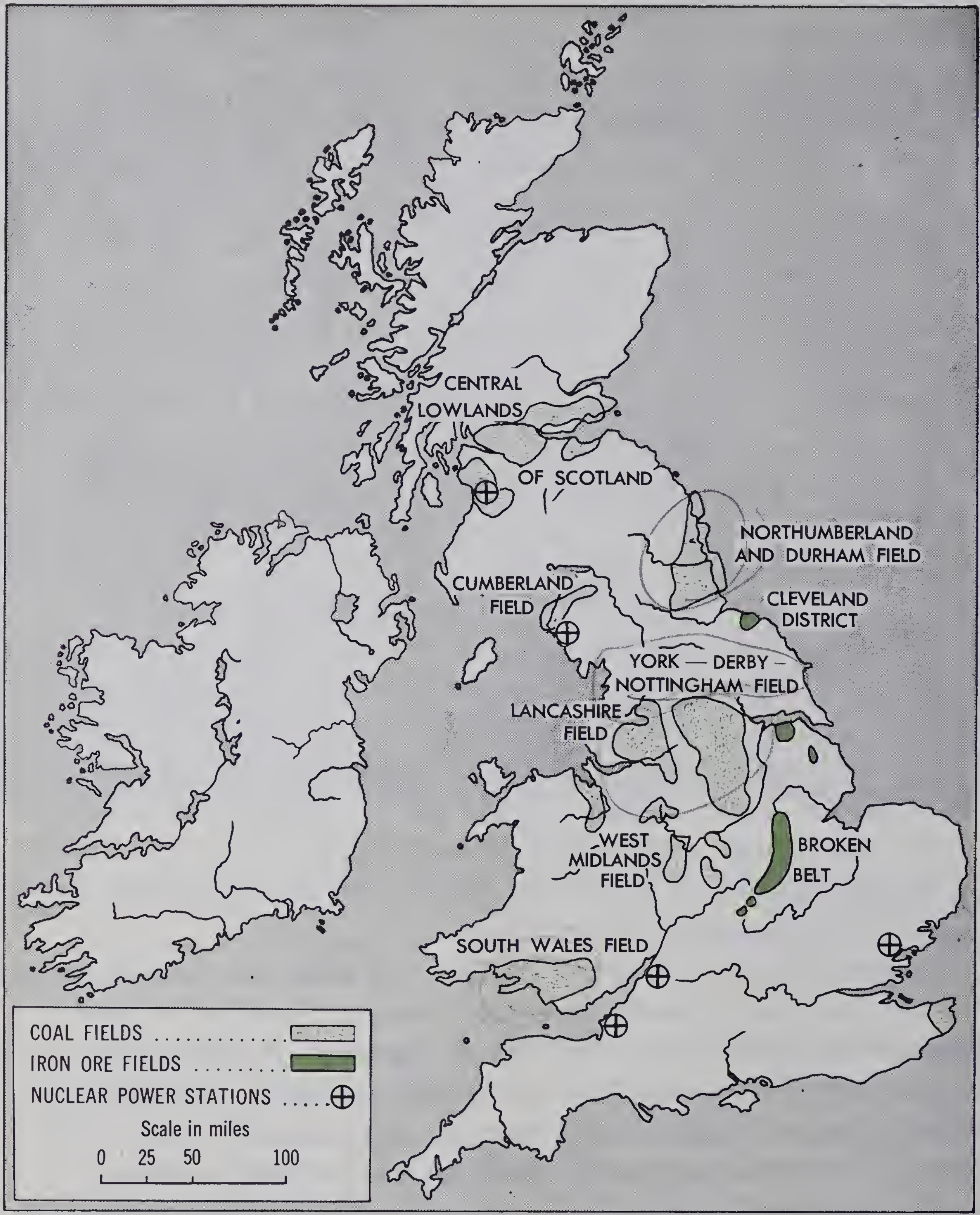
Although Britain is estimated to have enough coal to last for another 200 years, the reserves of coking coal, which is so essential in the making of steel, are limited.

Iron Ore — Several million tons of iron ore are mined annually, but Britain's steel mills need roughly twice as much as is produced. More iron ore is imported from Spain, North Africa, Greece, and Canada.

The principal sources of iron are found along a broken belt from the Humber river south-westward across south-central England (over nine-tenths of the supply comes from this area), and in the Cleveland district of Yorkshire. Most of Britain's iron ore yields only a small amount of iron per ton. *Map 10*

Other Metals — Small amounts of lead, tin, and zinc are mined, but much greater quantities must be imported to meet the needs of industry. Only insignificant amounts of gold, silver, and copper are produced. The once famous tin mines of Cornwall in southwestern England have been closed because costs of production have risen above the value of the tin being mined.

Non-Metallic Minerals — Much limestone is quarried for use (1) in smelting iron ore, (2) for manufacturing cement, and (3) for building. Also useful for building are sandstone, slate for roofing, and clay which is used to make bricks, the most common building material in Britain. Granite and basalt are quarried for use in road-building. In the counties of Devon and Cornwall on the south-

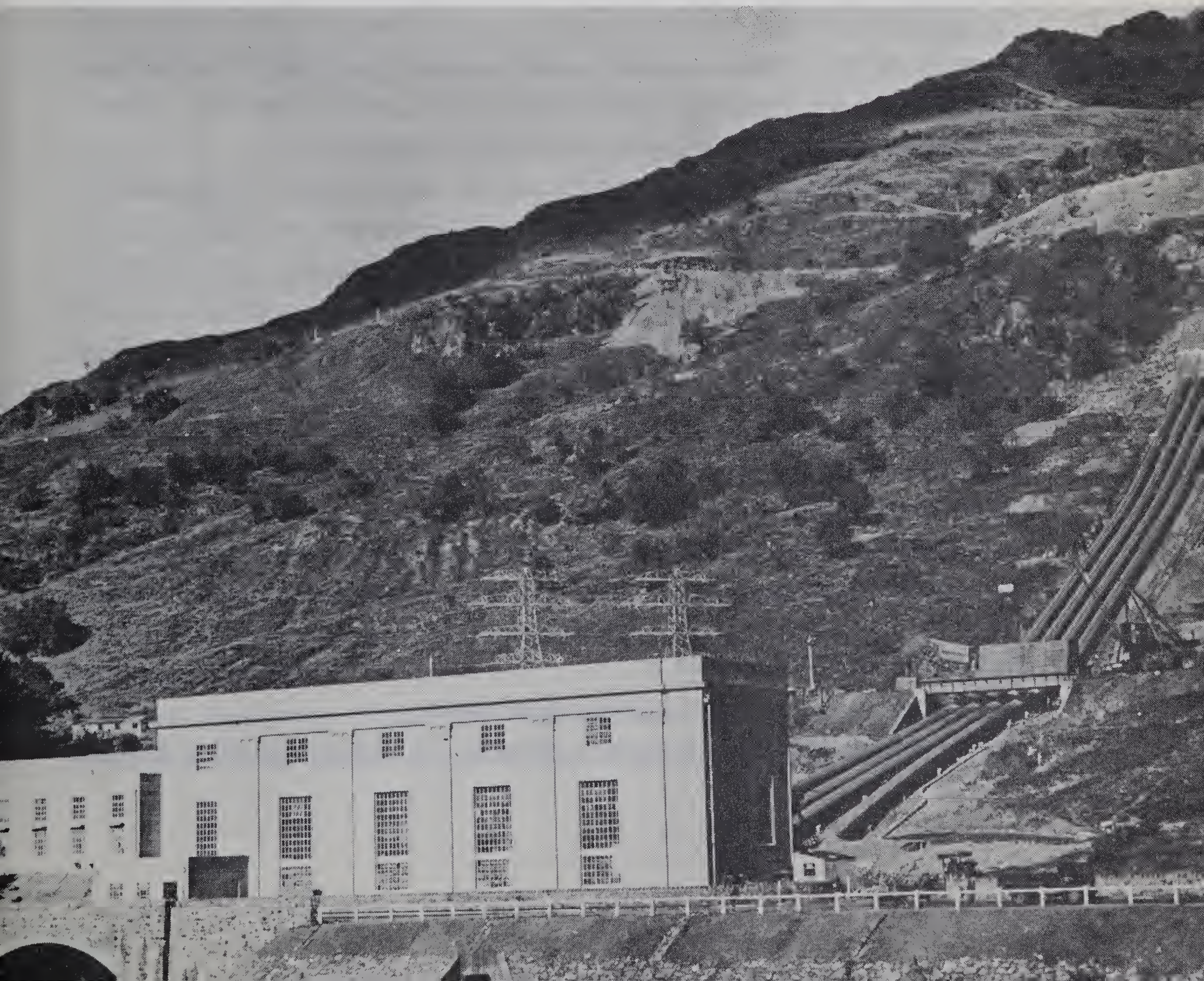

CENTRAL
LOWLANDS
OF SCOTLAND
NORTHUMBERLAND
AND DURHAM FIELD
CUMBERLAND
FIELD
CLEVELAND
DISTRICT
YORK — DERBY —
NOTTINGHAM FIELD
LANCASHIRE
FIELD
WEST
MIDLANDS
FIELD
BROKEN
BELT
SOUTH WALES FIELD
COAL FIELDS
IRON ORE FIELDS
NUCLEAR POWER STATIONS
Scale in miles
0
25
50
100

Map 10. Coal, Iron, and Nuclear Power.
On the map many of the coalfields extend beyond the coastline. This indicates that these deposits do continue under the sea. As in our own Cape Breton coalfields, many of the mines have shafts running out under the ocean floor. The nuclear power stations shown are those already built, but others are planned.

western peninsula of England, decomposed granite (Kaolin or china clay) is mined for use in the manufacture of pottery, paper, and chemicals. Salt is obtained in northern and western England. Valuable industrial minerals produced are fluorite, which is used in the manufacture of steel, and barite, which serves as a filler in linoleum and an extender for paint.

Power *Electricity* — Less than two per cent of Britain's electricity is produced by water, the most common source of electricity in Canada. Only in the North of Scotland are there enough suitable rivers and power sites to have allowed hydro-electricity to become the principal source of power. The vast majority of Britain's *Fig. 17*

Figure 17. Hydro-Electric Power Station in Scotland.
This particular station is situated on the banks of Loch Lomond in the Scottish Highlands. The long parallel pipes on the slopes behind the power station are "penstocks". The water rushes down through the penstocks to drive the turbines, which generate electricity.



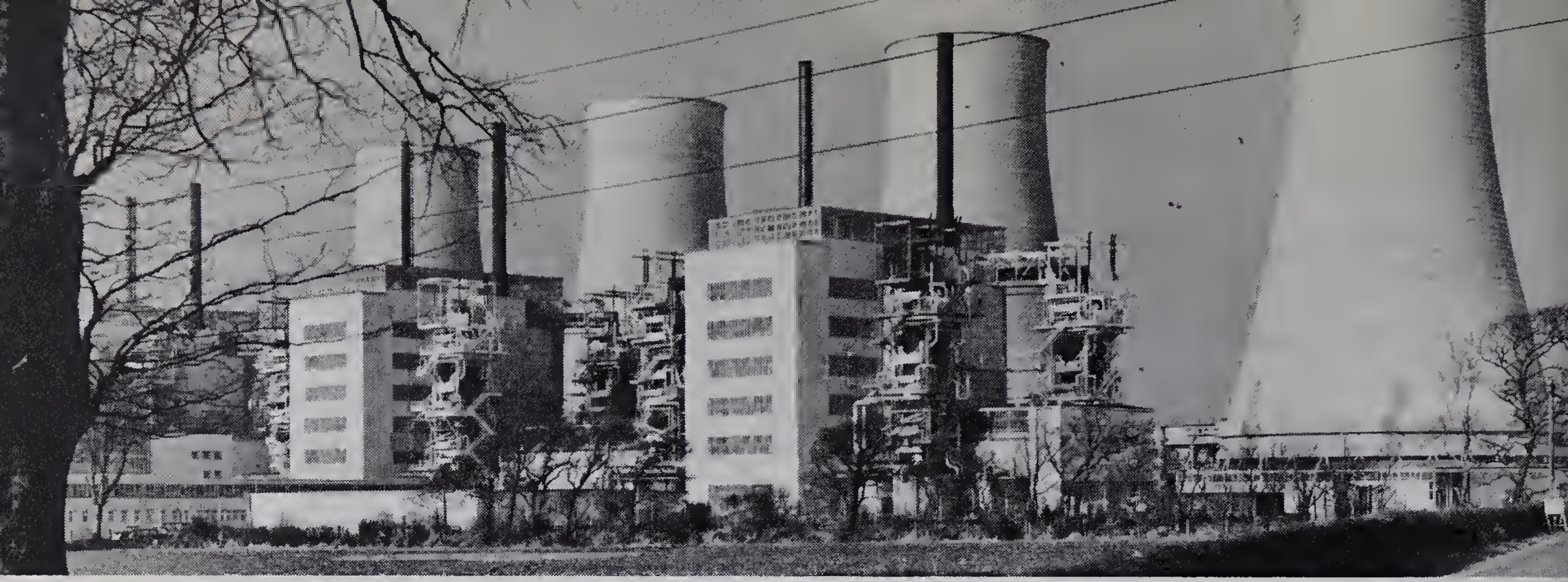


Figure 18. A Nuclear Power Station in Scotland.
By 1966, it is expected that 25 per cent, and by 1976 practically all, of Britain's electricity will be generated by nuclear power stations like this one. This station is similar to the one at Calder Hall — the world's first full-scale nuclear power station.

power stations are steam-driven with coal as the primary fuel. To save coal and ensure future power supplies, the United Kingdom has *Map 10* begun a large programme for the generation of electricity by nuclear energy. The first full-scale nuclear power station in the world was completed at Calder Hall in northwestern England in 1956. Although *Fig. 18* experimental, its success has started the British on an ambitious building plan which will soon make nuclear power a serious competitor of coal in the production of electricity.

Oil — Britain needs large quantities of oil to provide power for its numerous cars, trucks, airplanes, and farm machines. Having only very small deposits of crude oil, the United Kingdom must import millions of tons of it—mostly from the Middle East.

Gas — Since the British Isles have practically no natural gas, it must be manufactured from coal or obtained as a by-product in the refining of crude oil. Gas, therefore, does not assume as important a place in the power picture of the British Isles as it does in Canada where natural gas is plentiful.

Peat — The peat bogs mentioned previously provide a cheap but low-quality fuel in many local areas, especially in Ireland.

MANUFACTURING

UNITED KINGDOM

The manufacturing industry dwarfs all others in the British economy, providing more than four-fifths of the country's exports. Over nine million workers, or roughly two-fifths of all employed, are engaged in manufacturing.

Once undisputed leader in manufacturing, Britain still ranks as one of the world's chief manufacturing nations, surpassed only by the United States and the Soviet Union and roughly equalled by West Germany and Japan. Although Canada is rapidly becoming industrialized, the output of its factories still falls far short of those in the United Kingdom.

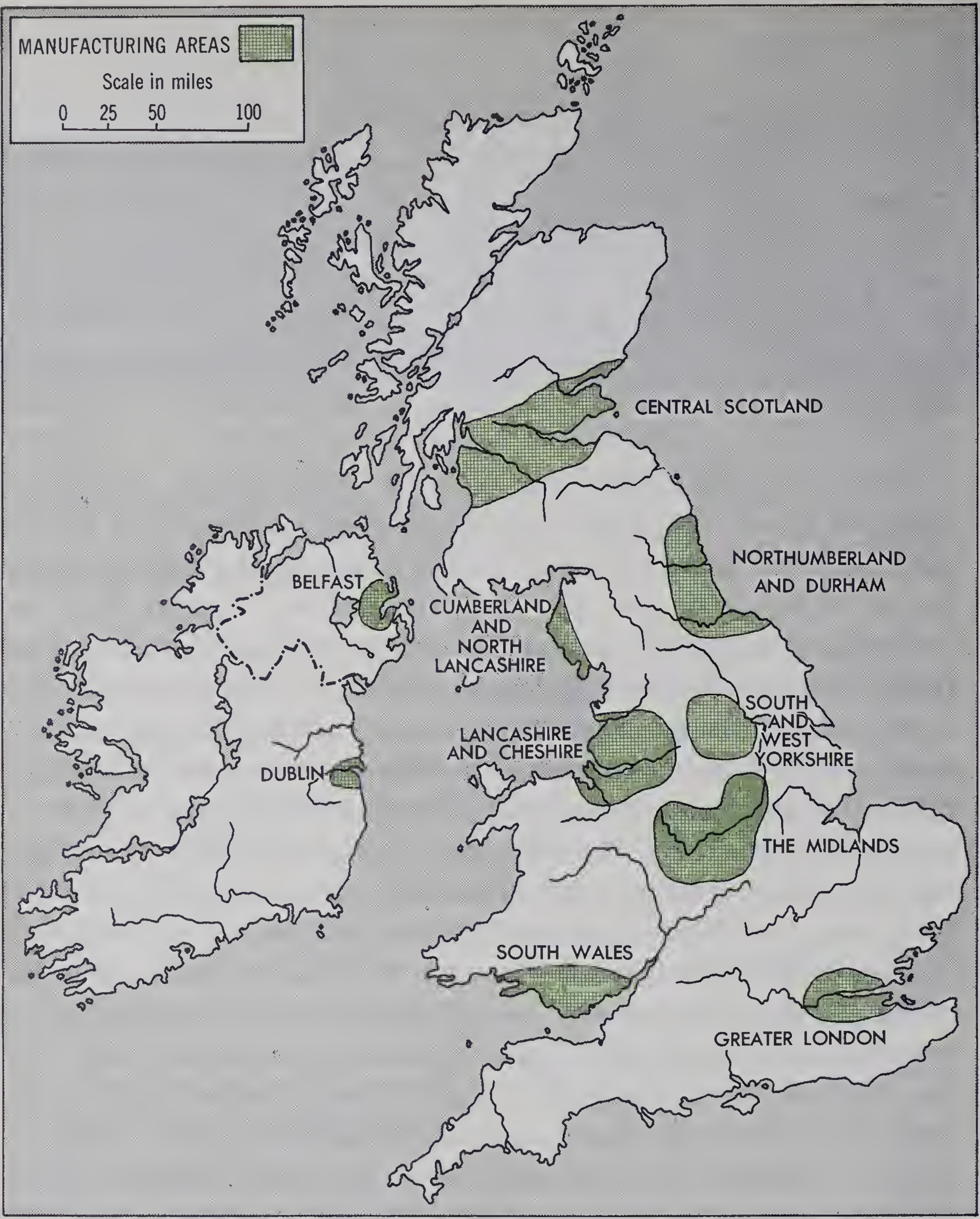
Modern manufacturing was born in Great Britain. The availability of cheap coal, together with the development of new machinery, methods, and products by British inventors and engineers gave Britain a big lead over her early competitors. Today, there are countries with greater natural advantages for manufacturing than Britain, but she overcomes her lack of most raw materials and fuels through the craftsmanship of her industrial workers and her willingness and ability to invest huge sums of money for scientific modernization. Industrial output has been increased over fifty per cent in the past twenty years, and Britain shares world leadership in the production of such highly technical products as jet aircraft, electronics equipment, synthetic materials, and thermo-nuclear equipment.

Most of the main industrial centres of Britain developed near the coalfields where fuel was cheap. Important manufacturing areas, therefore, are found in (1) south and west Yorkshire; (2) Northumberland and Durham; (3) South Wales; (4) the Central Lowland of Scotland; (5) Lancashire and Cheshire; (6) the Midlands, and (7) Cumberland. The only major industrial areas to develop without the benefit of local coal were (8) Greater London and (9) Northern Ireland.

Map 11

Metals *Iron and Steel* — Iron and steel are the basic raw materials of most industrial products, so the iron and steel industry is the basic industry of any manufacturing nation like Britain. Of almost 600,000 metal-workers, four-fifths are employed in the iron and steel industry.

When iron ore, limestone, manganese, and coal or coke are smelted in blast-furnaces, crude iron is produced. At this stage the


MANUFACTURING AREAS
Scale in miles
0
25
50
100
CENTRAL SCOTLAND
NORTHUMBERLAND AND DURHAM
BELFAST
CUMBERLAND AND NORTH LANCASHIRE
SOUTH AND WEST YORKSHIRE
LANCASHIRE AND CHESHIRE
DUBLIN
THE MIDLANDS
SOUTH WALES
GREATER LONDON

Map 11. Main Manufacturing Areas.

iron is often called *pig-iron* because it is usually cast (poured into moulds and allowed to cool and harden) into lumps known as pigs. The composition of the ore determines the type of pig-iron that results, which in turn determines the use to be made of the pig-iron. Some of it is used to make cast iron, some of it to make wrought-iron, but four-fifths of it to make steel.

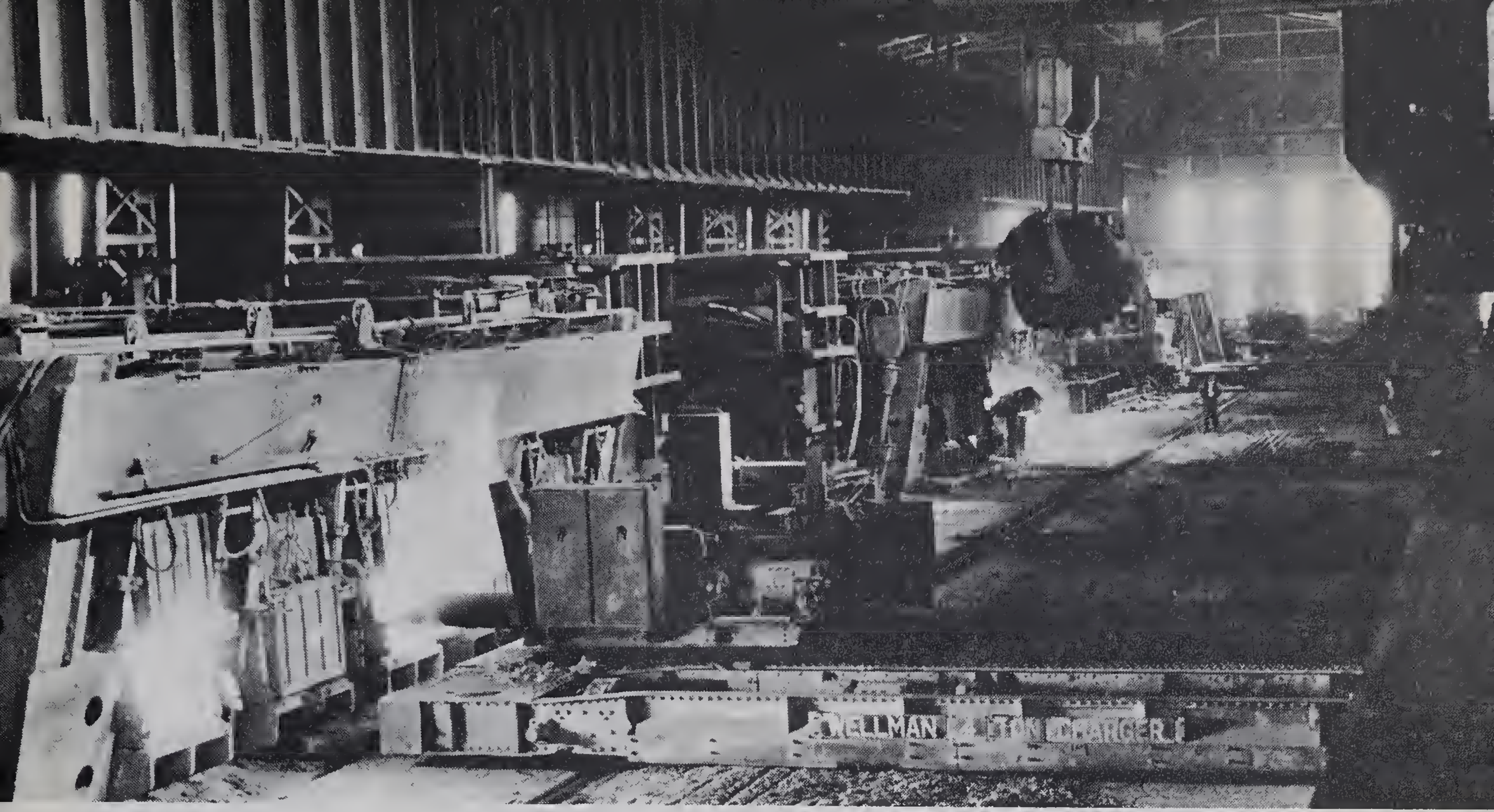


Figure 19. A British Steel Factory.
This steel factory located in the Midlands contains three large open-hearth furnaces. Raw materials are fed into the furnaces by overhead cranes and by "chargers", one of which is seen in the foreground. This type of furnace uses scrap metal as well as iron ore.

Fig. 19

Three types of furnaces can be used to turn pig-iron into steel—a Bessemer converter, an open-hearth furnace, or an electric furnace. The open-hearth furnace which allows the use of scrap as well as pig-iron is most common in ore-poor Britain. The steel is either cast into a particular shape for some special purpose or produced as ingots which must be further processed into castings or converted into plates, sheets, rails, girders, rods, and many other steel products. The major consumers of steel are the shipbuilding and motor vehicle industries. Adequate amounts of limestone and coal are available in the country, but roughly one-half of the iron and manganese ore is imported, chiefly from Sweden, Algeria, and Canada. Also imported are large quantities of pig-iron, scrap, and partly-manufactured steel for finishing.

Most of Britain's large iron and steel centres grew originally in places where iron ore and coking coal were found close together. In many cases, the original coal deposits or ore bodies have been exhausted, and raw materials must be shipped in from foreign or other British sources. The initial locations have kept and developed their steel industries because distances to new sources of raw materials are small in Britain and because the skill of the workers in those areas and their use of advanced methods of making and working steel have become more important than the availability of local supplies of coking coal and iron.

Map 12 The main iron and steel production areas may be seen on map 12. South Wales and the Northeast coast of England are the two largest steel-producing areas.

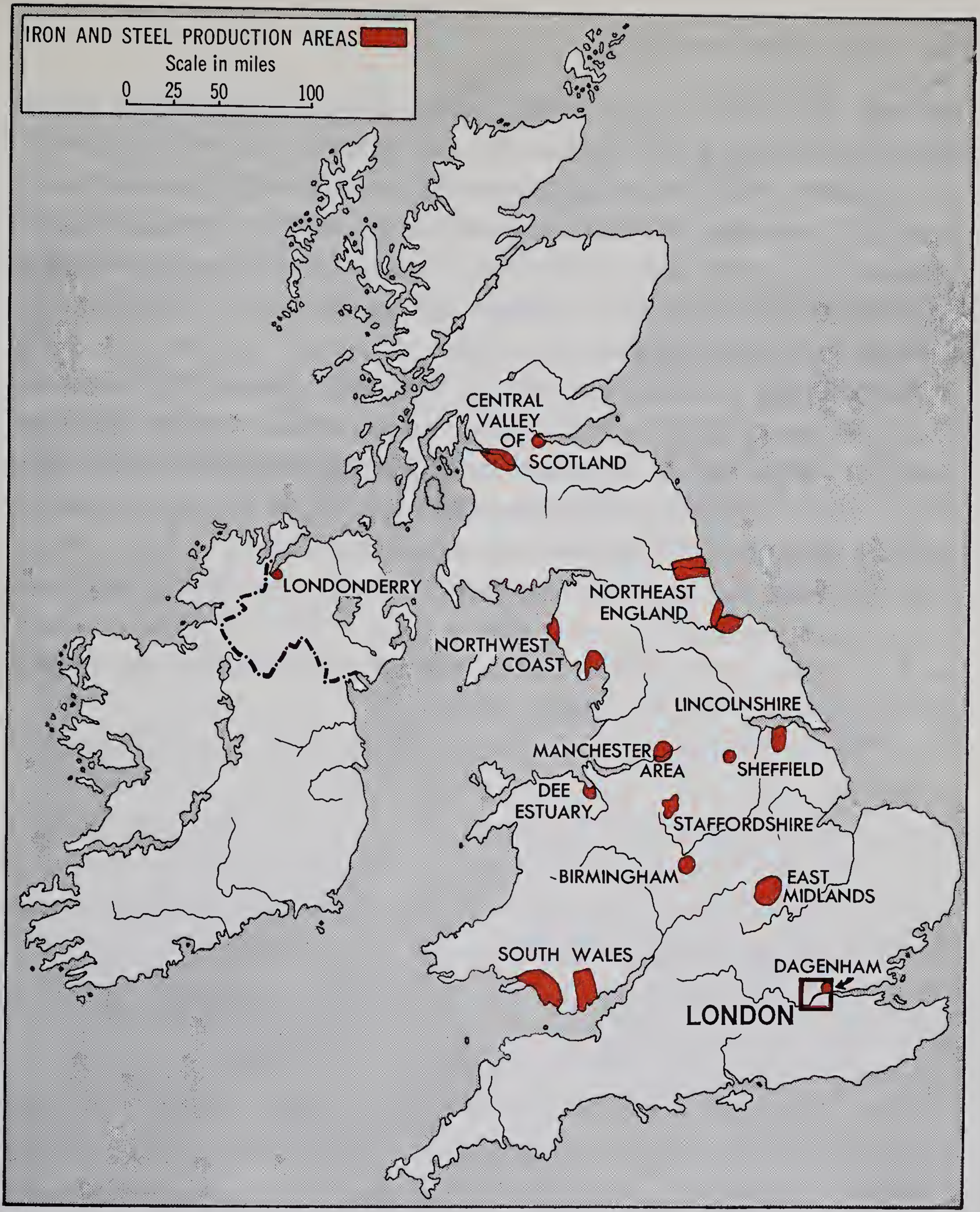
(1) *South Wales*: Engaged mainly in the manufacture of tinplate from imported tin, South Wales has large plants near Swansea that manufacture two-thirds of the nation's supply. The Swansea area also produces copper plating and galvanized iron. South Wales still has sufficient coking coal for its blast furnaces but must import iron ore to replace the original local ore. One of the world's largest steel plants, stretching four and a half miles along the Welsh coast, has a yearly output of 2½ million tons of steel ingots and a third of Britain's sheet steel.

(2) *Northeast England*: Producing about one-fifth of the national steel output, this area stresses the making of rails and of steel plates for shipbuilding. Middlesbrough is the chief centre of production. Some iron ore is obtained in the Cleveland Hills, but much more must be imported.

(3) *Lincolnshire*: The district around Scunthorpe and Frodingham supplies another tenth of Britain's steel. Here low-grade local iron ore, obtained cheaply by open-pit mining, is combined in blast furnaces with good coking coal from Yorkshire to produce ingots for local steel plants.

(4) *East Midlands*: In the East Midlands a series of centres use local supplies of low grade iron ore in the making of both iron and steel.

(5) *Other Steel-Making Centres*: Other important steel producing districts are found around Birmingham, in Sheffield, on the northwest coast of England, in the Central Valley of Scotland, on the Manchester Ship Canal and the Estuary of the Dee, and on the estuary of the Thames. Most of these centres still have adequate local coal, but they all must obtain iron ore, pig-iron, and scrap


IRON AND STEEL PRODUCTION AREAS 🟥
Scale in miles
0
25
50
100
CENTRAL VALLEY OF SCOTLAND
LONDONDERRY
NORTHEAST ENGLAND
NORTHWEST COAST
LINCOLNSHIRE
MANCHESTER AREA
SHEFFIELD
DEE ESTUARY
STAFFORDSHIRE
BIRMINGHAM
EAST MIDLANDS
SOUTH WALES
DAGENHAM
LONDON

Map 12. Iron and Steel Production Areas.

from other British steel-making areas or from abroad. Of the principal steel-producing centres, only Dagenham, on the estuary of the Thames, lies any distance from a main coalfield.

Britain is renowned throughout the world for the fine quality of its alloy steels. The city most noted for its excellent steel is Sheffield, which uses some of its output to make world-famous stainless steel cutlery. The nation now ranks fourth in steel production and is constantly building new steel works and modernizing existing plants.

Other Metal-Processing Industries — Although Britain usually must use imported metals and metal ores, she has significant non-ferrous (non-iron) metal industries, mainly involved in the smelting and/or later processing of aluminium, copper, lead, nickel, magnesium, zinc, and the precious metals.

Map 11

Engineering Manufacturing all types of mechanical devices, the engineering industry employs over two million workers and supplies two-fifths of total exports. The following descriptions of several major areas of British engineering will give some idea of the diversity and volume of the products manufactured.

Machine Tools — To manufacture its great range of products, the engineering industry must have a large variety of powered tools, such as lathes and planers. All of the great manufacturing centres of Britain have a share in their making.

Textile Machinery — The principal centres of textile machinery production are, quite naturally, in the textile manufacturing areas around Manchester in Lancashire, in western Yorkshire around Leeds, in the East Midlands, in East Scotland, and in Northern Ireland. Traditional leadership in the production of fine textile machinery has helped Britain to remain the world's largest producer, with half of its output being exported.

Agricultural Machinery — Thousands of tractors, ploughs, mowers, combines, milking machines, and other farm machines roll off British assembly lines for the highly mechanized farms of the United Kingdom and for export. Only the United States makes more tractors than Britain.

Locomotives — The world's first locomotive and locomotive works were built in England. The United Kingdom now builds roughly 1000 diesel and diesel-electric locomotives every year and exports almost half of them.

Electrical Equipment — Having developed radar and other important electrical devices, the British electrical industry annually produces hundreds of millions of dollars worth of equipment, such as telegraph, telephone, and power-generating equipment and a full range of household appliances.

Manchester and Rugby are the main centres producing heavy industrial equipment like dynamos and large electric motors. Lighter equipment and appliances are manufactured in London, Glasgow, Manchester, and Birmingham.

Shipbuilding — Once the undisputed leader, the United Kingdom still ranks as one of the world's foremost shipbuilding nations. Construction varies from giant oil tankers and passenger and cargo liners to tramp steamers, tugs, and fishing boats. The chief centres of shipbuilding are (1) along the Clyde River in Scotland, (2) along the Tyne River, (3) along the Tees River, (4) Barrow, (5) Birkenhead, and (6) Belfast in Northern Ireland. Each area has its specialty. Clydeside is noted for building large

Map 13

Fig. 20

Figure 20. Shipbuilding in Northern Ireland.
This shipbuilding yard in Belfast is one of the largest in the world. Several ships in various stages of building and the massive cranes and intricate framework necessary for their construction are shown.

passenger ships like the Queen Mary and Queen Elizabeth; Tyneside for the construction of oil tankers, tramp steamers, and vessels for transporting coal. Belfast emphasizes large liners and cargo ships. Barrow and the southern centres of Devonport, Portsmouth, and Chatham build naval craft. Fishing boats of various types are built at Hull, Aberdeen, Dundee, and other ports used by fishing fleets.

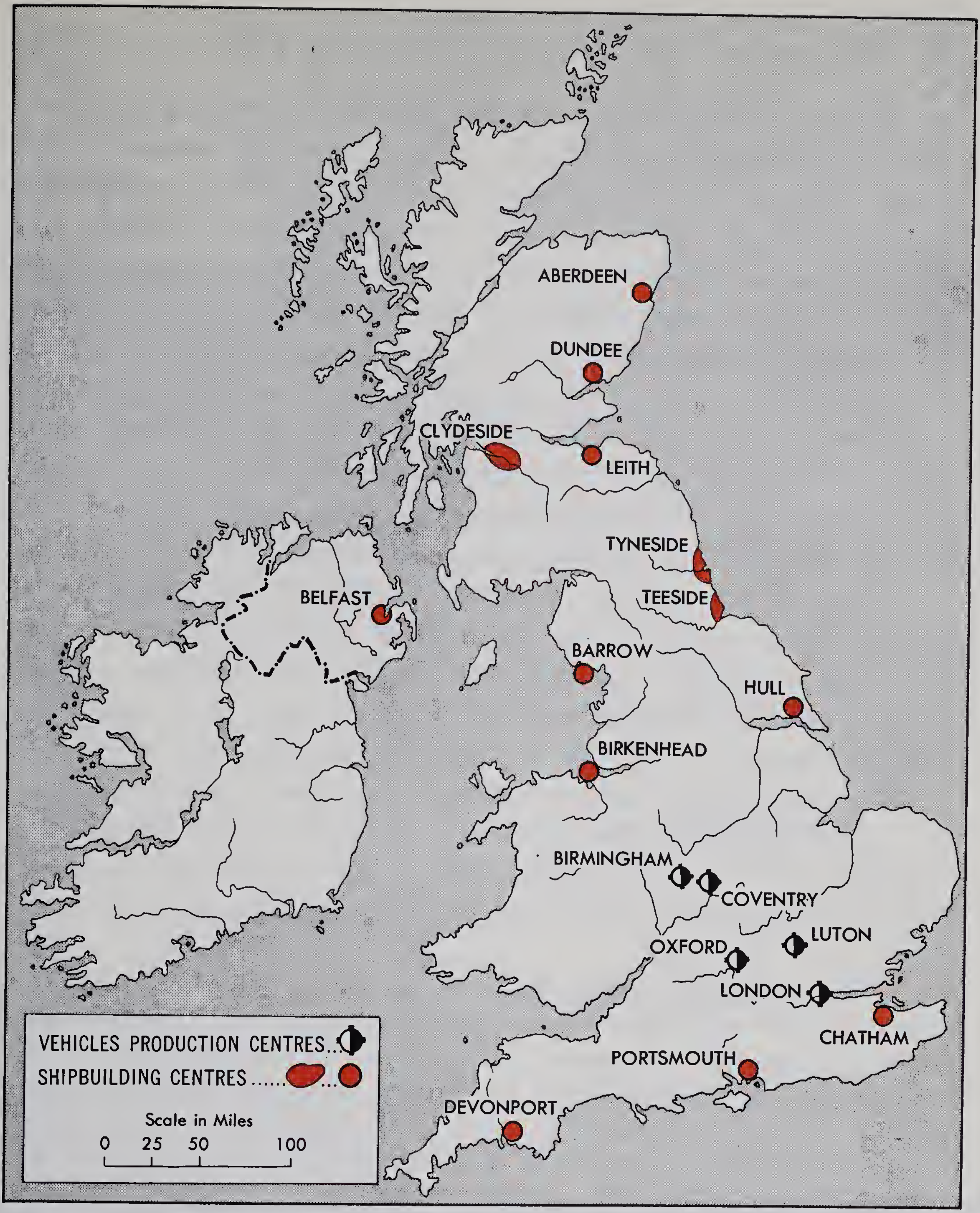
Although many ships built on British ways are for her own navy or merchant marine, the United Kingdom yards receive orders for ships from all around the globe. To keep the shipbuilding industry strong, Britain is pioneering in the development of gas turbine and nuclear-powered ships.

Cars, Commercial Vehicles, Motor Cycles, and Bicycles — Yearly production of cars, trucks, and buses usually exceeds one million, while almost 200,000 motor cycles and 2½ million bicycles emerge from British factories every year. The excellent quality of these vehicles creates a demand for them in many parts of the world, including the highly competitive markets in Canada and the United States.

Five companies dominate the motor industry. They are the British Motor Corporation which includes Austin and Nuffield, Ford, Rootes, Standard, and Vauxhall. The major centres of production are located in the Midlands (especially Coventry and Birmingham), Greater London (Dagenham), Oxford, and Luton. *Map 13*

Aircraft — Britain pioneered the gas turbine engine and began the world's first scheduled jet service in May 1952 with the de Havilland Comet. Today, the production and export of turboprop and jet airliners made by de Havilland, Bristol, Vickers, and other aircraft manufacturers keep the United Kingdom among the world's leaders in aircraft production. The Rolls-Royce firm, so famous for its luxury automobiles, supplies half the world demand for civil gas turbine engines from its plants in Derby in the Midlands.

Other Engineering Products — To the formidable list of engineering products already mentioned may be added cutlery, tools, hardware, instruments of all sorts, pumps, boilers, bridges, equipment for construction, refrigeration, the production of petro-


ABERDEEN
DUNDEE
CLYDESIDE
LEITH
TYNESIDE
TEESIDE
BELFAST
BARROW
HULL
BIRKENHEAD
BIRMINGHAM
COVENTRY
LUTON
OXFORD
LONDON
CHATHAM
PORTSMOUTH
DEVONPORT
VEHICLES PRODUCTION CENTRES
SHIPBUILDING CENTRES
Scale in Miles
0 25 50 100

Map 13. Shipbuilding and Vehicle Production.

leum, and the printing and binding of books. A host of other items, too numerous to mention, are also produced. A large volume of production in the manufacture of mechanical devices makes engineering the leading industry of the United Kingdom.

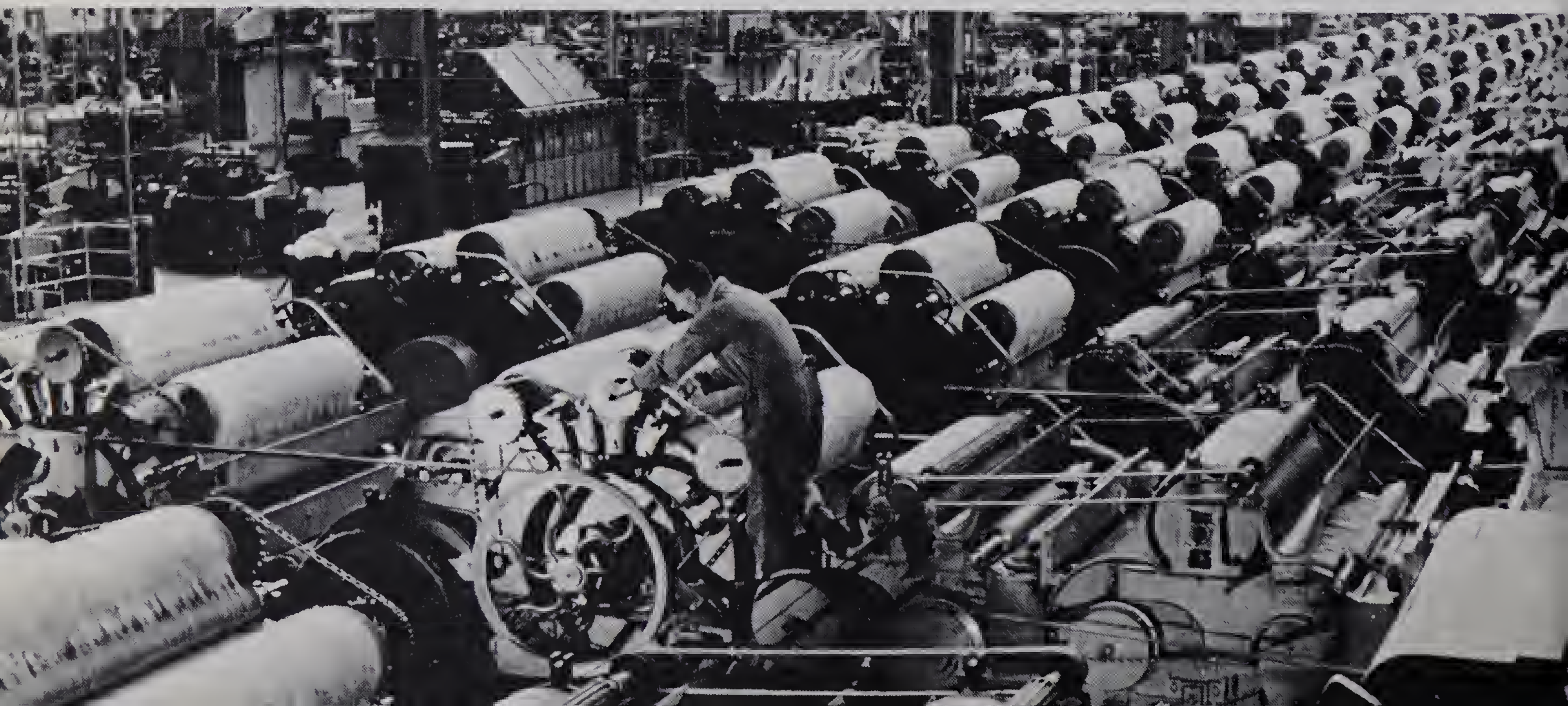
Textiles and Clothing The making of fabrics and clothing has been an important industry in Britain ever since the basic machinery for spinning fibres into a continuous thread and weaving them into cloth were invented in Britain during the Industrial Revolution. The textile industry as a whole employs nearly a million people who process the natural fibres of wool, cotton, linen, jute, and silk, and manufacture lace, hosiery, carpets, rayon, and other synthetic fibres. Britain is the foremost exporter of textiles, supplying about half of all exported woollen goods and 15 per cent of the world's exports of cotton goods. The clothing industry employs approximately half a million workers to give the combined textile and clothing industries a working force of 1½ million—more people than Canada has working in all of her manufacturing industries put together. Ten per cent of all Britain's exports are produced by these two industries.

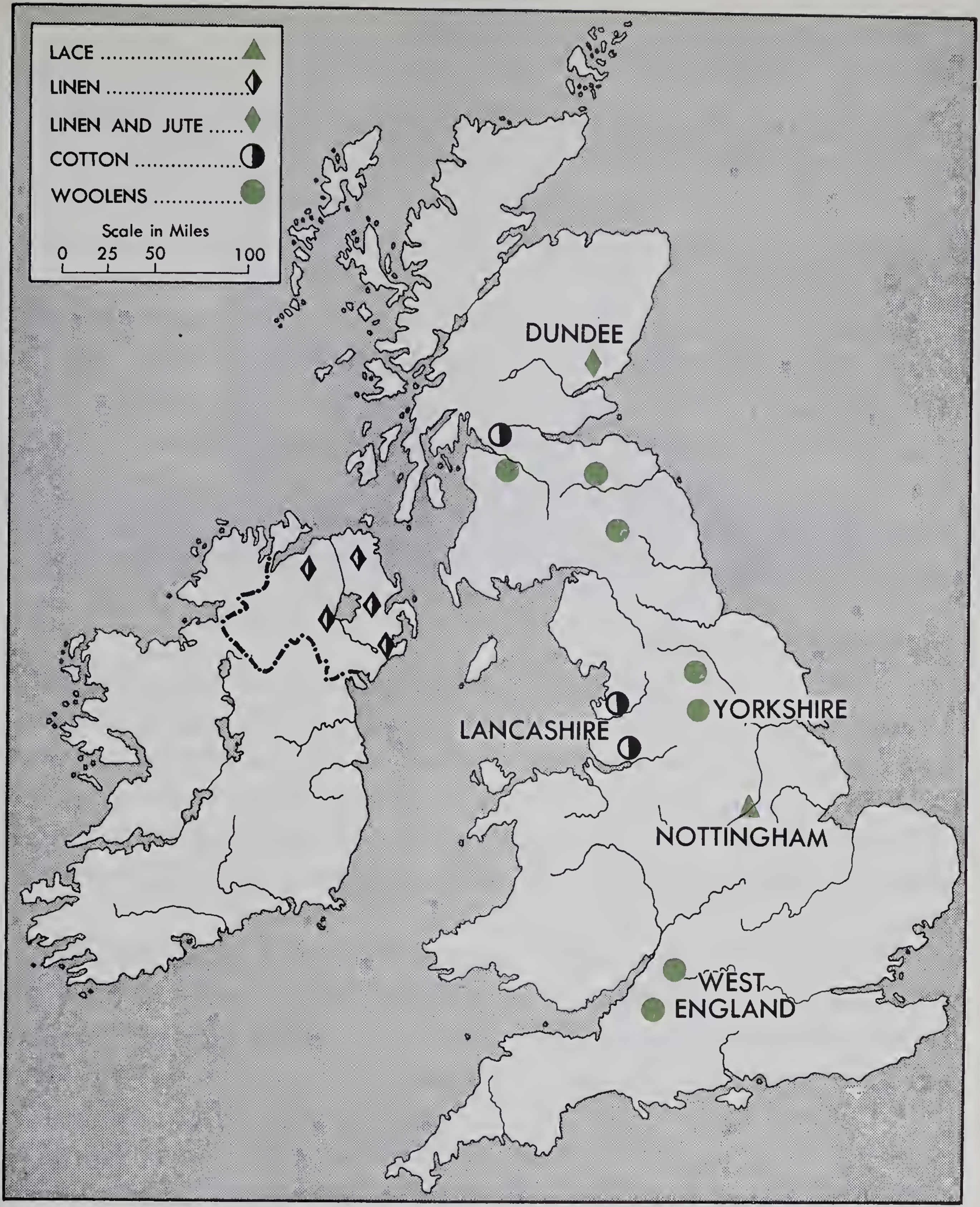
Fig. 21

Map 14

Wool — The making of woollen cloth is Britain's oldest staple industry. A number of factors attracted the wool industry to western Yorkshire during the Industrial Revolution. The area had a large sheep population and adequate supplies of soft, pure water for washing raw wool and for use in the bleaching and dyeing of woollen yarn. Local coalfields supplied the power needed to drive the textile machinery. Yorkshire still produces most of the nation's woollens and worsteds, particularly at the centres of Bradford, Halifax, Huddersfield, and Leeds. The rest are made in the West

Figure 21. "Carding" Wool in a Textile Factory.
This is the process whereby wool is combed out and prepared for spinning. Like most British textile factories, this one at Darlington is so mechanized that it requires only two men to keep this row of machines fed with wool. This type of mechanization has enabled Great Britain to maintain her leadership in the textile industry.




LACE
LINEN
LINEN AND JUTE
COTTON
WOOLENS
Scale in Miles
0 25 50 100
DUNDEE
LANCASHIRE
YORKSHIRE
NOTTINGHAM
WEST ENGLAND

Map 14. Textiles and Clothing.

of England, in Southern Scotland, and in the Hebrides where the famous Harris Tweed is woven in the homes of the people.

Cotton — Almost all of the cotton industry is concentrated in the Lancashire towns around Manchester, which serves as the marketing centre. Like Yorkshire, the county of Lancashire had large supplies of soft, pure water and good coal. The port of Liverpool, and later the Manchester Ship Canal, offered easy entry for the raw cotton imported from sub-tropical countries, including the United States, India, Egypt, and Brazil. The damp air of Lancashire helped to keep the cotton fibres soft and easy to spin and weave.

The low standard of living which exists in the Asian countries of India and Japan means that the cotton industries in those nations have low wage rates that enable them to produce more cheaply than their British competitors. The sale of these cheaper cotton products has reduced the world demand for British cotton, so that the industry is now producing only 60 per cent of its 1937 output. However, there are still a quarter of a million workers engaged in the manufacture of cotton goods — more than any single manufacturing industry in Canada.

Linen — As the world's largest manufacturer of linen, Northern Ireland makes a product world-famous for its high quality. Belfast and Londonderry are the main production centres. Although some Irish flax is used, most of the linen is made with flax from Belgium. A small amount of linen is produced in Dundee and a few other towns in Eastern Scotland. The United States is the main buyer of British linens. *Fig. 22*

Jute — Raw jute from hot, wet East Pakistan and jute cloth from India are used in the manufacture of sacks, bags, twine, the backing of carpets and linoleum, tarpaulins, and roofing fabrics. Dundee produces most of the nation's jute goods.

Silk and Lace — British firms produce silk textiles, using raw materials from Japan and Italy; production is centred at Nottingham. The United Kingdom is the leading exporter of lace.

Synthetic Fibres — As in Canada, man-made fibres are manufactured, with rayon being made from wood-pulp and cotton lint, nylon from coal-derived chemicals, and terylene (sometimes called dacron) from petroleum. Such strange raw materials as peanuts, a waste product of milk, and a product of Scottish seaweeds are used to make other artificial fibres. When a synthetic fibre has been created, it is still a raw material and must be further manufactured by the machinery of the traditional textile industries. Therefore,

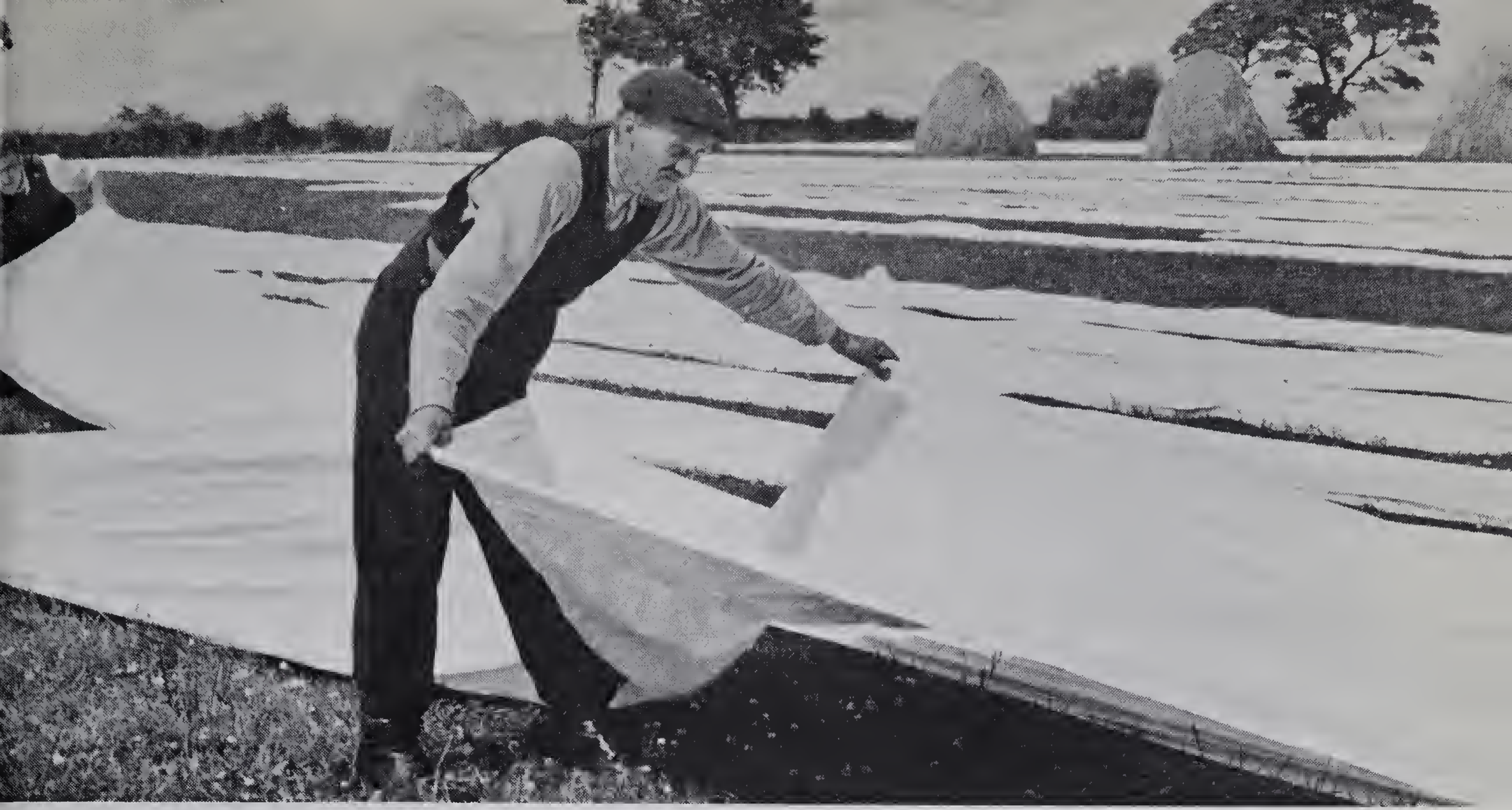
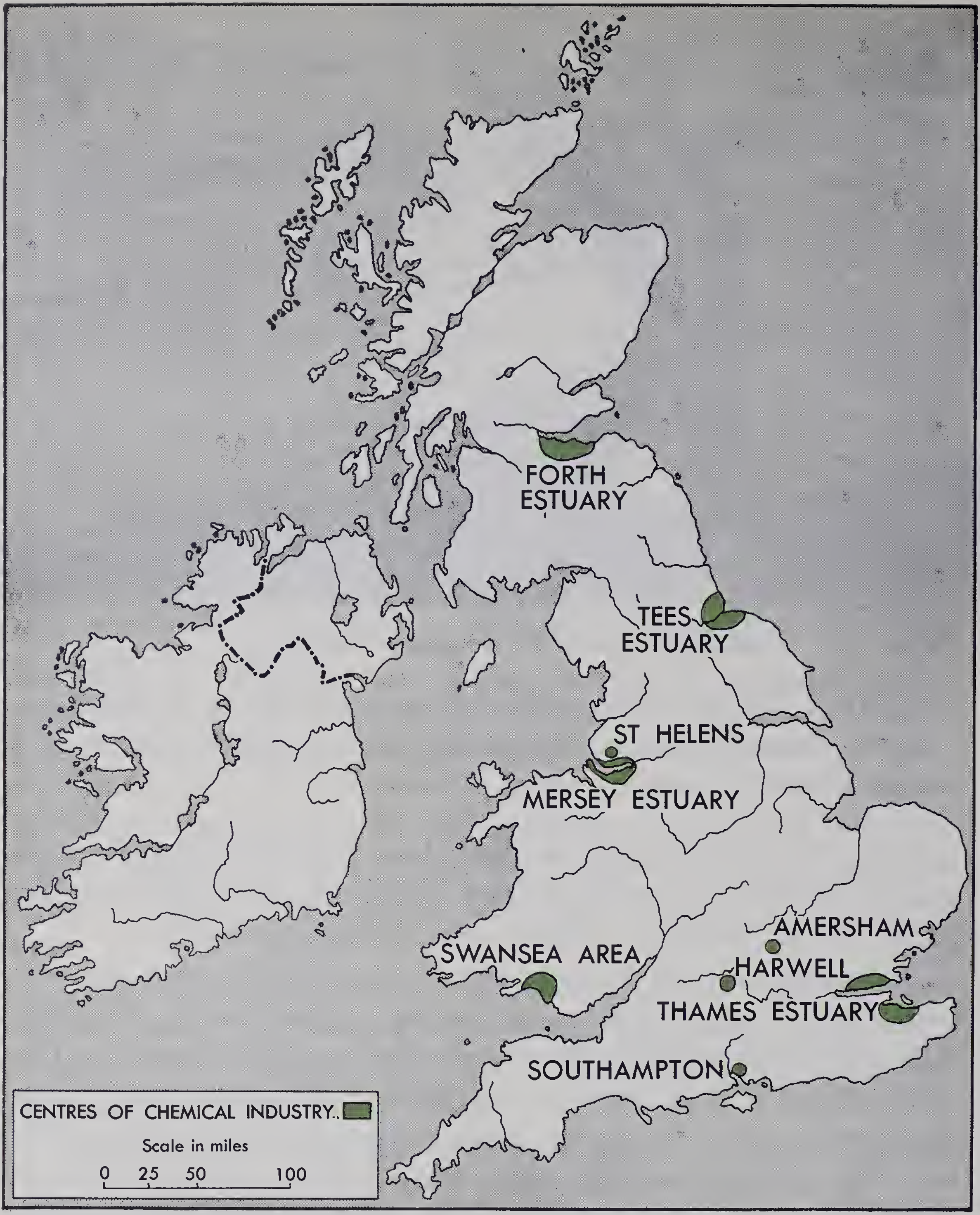


Figure 22. Bleaching Linen in Northern Ireland.
Linen is spread on the grass in fields around the factory. The pure moist air and sun bleach it without the use of chemicals. A brilliant white colour is achieved and the fabric remains undamaged. This linen is famous all over the world.

several plants producing these fibres have been built near the main textile centres in Lancashire and Yorkshire, but there are also plants in the Midlands, Wales, and Northern Ireland.

Clothing — The clothing trade has developed in many centres, particularly those already engaged in the textile industry. This facilitates a close cooperation and also enables the clothing trade to take advantage of a large supply of inexpensive, female workers. Leeds, Manchester, and Glasgow are among the chief cities making clothing. The manufacture of hosiery and knitwear is the specialty of Nottingham, Leicester, and the nearby towns of the East Midlands.

Chemicals The British chemical industry provides essential materials for home industry and eight per cent of all exports. Half a million chemical workers produce large quantities of acids, alcohol, alkali, explosives, fertilizers, soap, plastics, paint, medicines, glass, and many other important chemical products. Considerable quantities of chemicals or the raw materials for making them must be imported, but Britain does have adequate amounts of four important raw materials used in the chemical industry —


FORTH ESTUARY
TEES ESTUARY
ST HELENS
MERSEY ESTUARY
AMERSHAM
HARWELL
SWANSEA AREA
THAMES ESTUARY
SOUTHAMPTON
CENTRES OF CHEMICAL INDUSTRY.. 🟩
Scale in miles
0 25 50 100

Map 15. Centres of the Chemical Industry.

coal, salt, limestone, and pure water. Since all four are found close *Map 15* together near the Tees and Mersey estuaries, these areas have become the two main centres of chemical production. Location near estuaries provides both areas with port facilities to handle the bulky imports necessary to the industry and to make exporting easy.

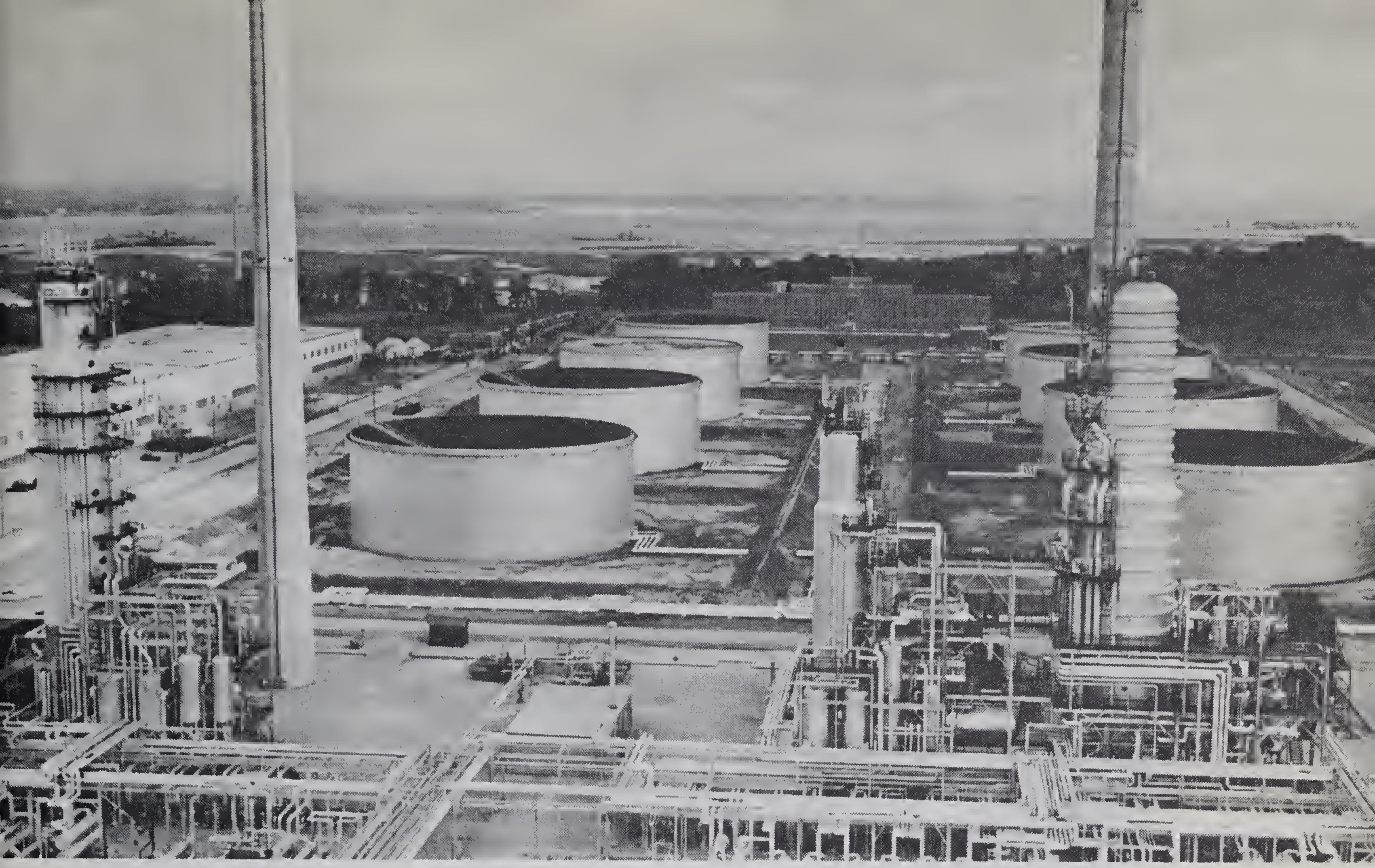


Figure 23. An Oil Refinery in Southern England.
Although there are almost no oil deposits in the British Isles, much refining of imported crude oil is done to supply fuel for industry and transportation. Most refineries are located on the coast so that the large oil tankers can dock and transfer their cargoes directly. This refinery is located near the port of Southampton.

Indicative of the advancement of the British chemical industry is its development of new products, such as the popular plastic, polythene, and its production of radioactive materials. The United Kingdom is the world's largest exporter of radioactive materials, which are produced at the atomic energy centres at Harwell in Berkshire and Amersham in Buckinghamshire. The recent development of large oil refineries in Britain has provided materials for a considerable *petro-chemical* output. The refineries separate crude oil into gasoline, diesel oil, fuel oil, lubricating oil, kerosene, and many other useful substances. A process called "cracking" increases the output of these products and yields petro-chemicals that can be used in the making of paints, plastics, detergents, synthetic rubber, man-made fibres, industrial solvents, sulphuric acid, and a multitude of other chemical products. Since the crude oil used must be imported, largely from the Middle East, the refineries are located on the coasts, but away from the busy commercial ports. Major refining and petro-chemical concentrations have developed in Scotland on *Fig. 23* the estuary of the Forth; in South Wales near Swansea; and in England near Southampton and around the estuaries of the Thames, Mersey, and Tees Rivers.

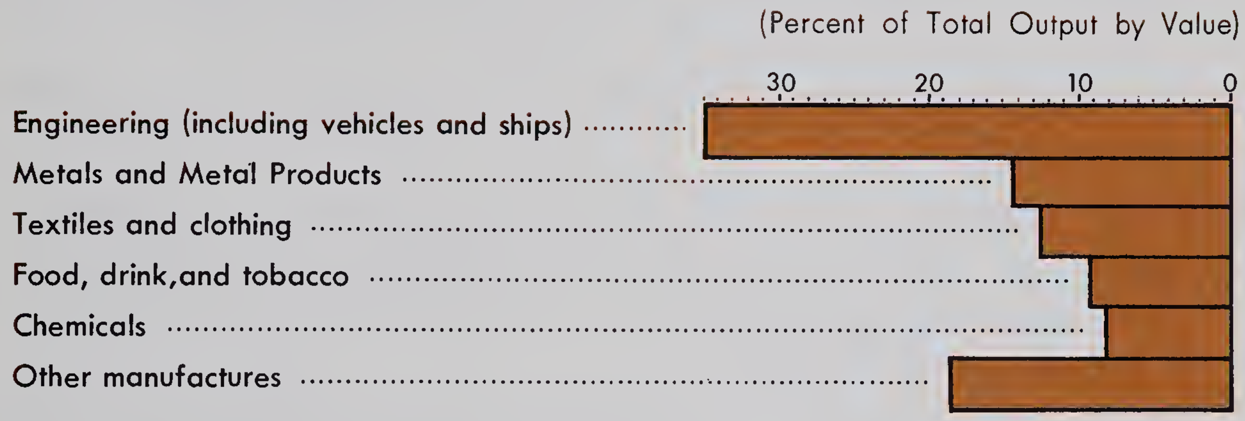
Food, Drink, and Tobacco This group of industries employs almost a million workers and supplies about six per cent of exports. Biscuits and chocolate are produced in sufficient quantities to meet home needs and still have a sizeable surplus for sale to other lands. Tobacco, sugar, and whisky are other important exports. The whisky, made from high quality English malted barley, enjoys world-wide popularity. Canada and the United States together buy more than half of Britain's total exports of whisky. Hundreds of breweries, using English hops and malt from home-grown barley, brew large amounts of beer. Enough tobacco products are manufactured to allow for a significant surplus for export despite the fact that all raw tobacco must be purchased from the United States, Rhodesia, India, and Canada.

London is the chief centre for the food and drink industries. Liverpool, Edinburgh, Hull and several other large cities are also important for food processing. Because large quantities of foodstuffs must be imported, the food industry is concentrated in port cities.

Other Important Industries Too numerous to describe in detail, but certainly worth mentioning, are several other major industries. St. Helens in Lancashire is important for making glass, and Stoke-on-Trent is famous for the fine pottery and porcelain it fashions, using china-clay from the southwest peninsula of England. Wedgwood and Royal Doulton are only two names made famous by the master craftsmen of the English pottery industry. By using imported raw rubber from Malaya, and by combining certain chemicals to produce synthetic rubber, Britain ranks second in the manufacture of rubber goods such as tires, tubes, and footwear. The making of boots and shoes occupies more workers than the rubber industries, and the tanning and finishing of leather about half as many. Over 80,000 people are engaged in brickmaking, and cement factories produce enough cement to satisfy home construction needs and to lead the world in its export.

A high literacy rate and good standard of living support a large printing industry which thrives in London, Edinburgh, and the other large cities. The making of jewellery and paper products completes the long, impressive list of goods manufactured in the highly industrialized United Kingdom.

A COMPARISON OF BRITAIN'S MANUFACTURING INDUSTRIES



THE REPUBLIC OF IRELAND

A national shortage of fuels, raw materials, investment money, and highly skilled industrial workers has limited the development of heavy industry in the Republic. However, about one-third of the nation's workers are engaged in numerous, small plants scattered across the country. Light industries produce textiles and goods for personal use, such as clothing, tobacco products, and shoes. Most other Irish industrial plants are engaged in the processing of the country's various farm products. Beer, whisky, flour, and bakery products are derived from its grains; and its many pigs and cattle supply small meat-packing plants, cheese factories, creameries, and milk-condensing plants. Dublin is the main manufacturing city, with Cork and Limerick occupying secondary positions.

WORK UNIT 4

The Language of Geography Add to your reference list definitions of the following terms: (Minerals) sources of power, coal seam, open-pit mining, crude oil, kaolin; (Manufacturing) blast furnaces, pig-iron, ingots, rayon, nylon, terylene, polythene, radioactive.

Problems and Projects

1. Make a bar graph to show how British coal production compares with that of (a) the United States, (b) France, (c) West Germany, and (d) Canada.
2. Draw diagrams to show (a) an open-pit mine and (b) a deep, or pit-shaft mine.
3. Using an economic atlas, mark on a world outline map the major centres of iron ore production.
4. How do Canada and the United Kingdom compare in the production of iron ore?
5. What companies in your community or province manufacture engineering products similar to those manufactured in Britain?
6. What major manufacturing industries of the United Kingdom are also important in Canada?
7. What problems that are hindering the Canadian coal industry also affect the British coal industry?
8. On a circle graph, indicate the percentage of iron ore consumed by British industries that is obtained (a) in Britain and (b) from each of its major suppliers.
9. What factors that exist in Britain are necessary for any nation to become an important manufacturing country?
10. What effects does the lack of a large manufacturing industry have upon the Republic of Ireland?

Maps

1. On a series of small maps of the British Isles mark
    (a) the major coal and iron ore fields
    (b) the iron and steel producing centres
    (c) the shipbuilding and vehicles centres

THE PEOPLE

The people of the British Isles are very similar to English-speaking Canadians. Although their accent and way of expressing themselves is slightly different, the language that most of them use is practically identical with ours. As in Canada, religious freedom is enjoyed by all, and most of the inhabitants are Christians. The main minority group consists of about 400,000 people of the Jewish religion. In both England and Scotland, there are established state churches, Anglican, of course, in England, and Presbyterian in Scotland; but several other Protestant denominations are well represented. Catholicism predominates in the Irish Republic and there is also a strong minority of Roman Catholics in the United Kingdom. Just as Roman Catholic Quebec is surrounded by predominantly Protestant provinces, so is the Republic of Ireland flanked by predominantly Protestant Britain.

Another similarity between Canada and the British Isles is the achievement of very high standards of health and education. In addition, British ideas of justice, freedom, and democracy are almost identical with ours. Indeed, Canadians inherited many of their customs and institutions from the British. Although the numbers and proportions of workers vary considerably, there is a strong similarity in the occupations found in the British Isles and Canada. This is largely due to their common location in the Mid-latitudes and to the intentional modelling of the Canadian economy upon that found in Western Europe, especially in Britain.

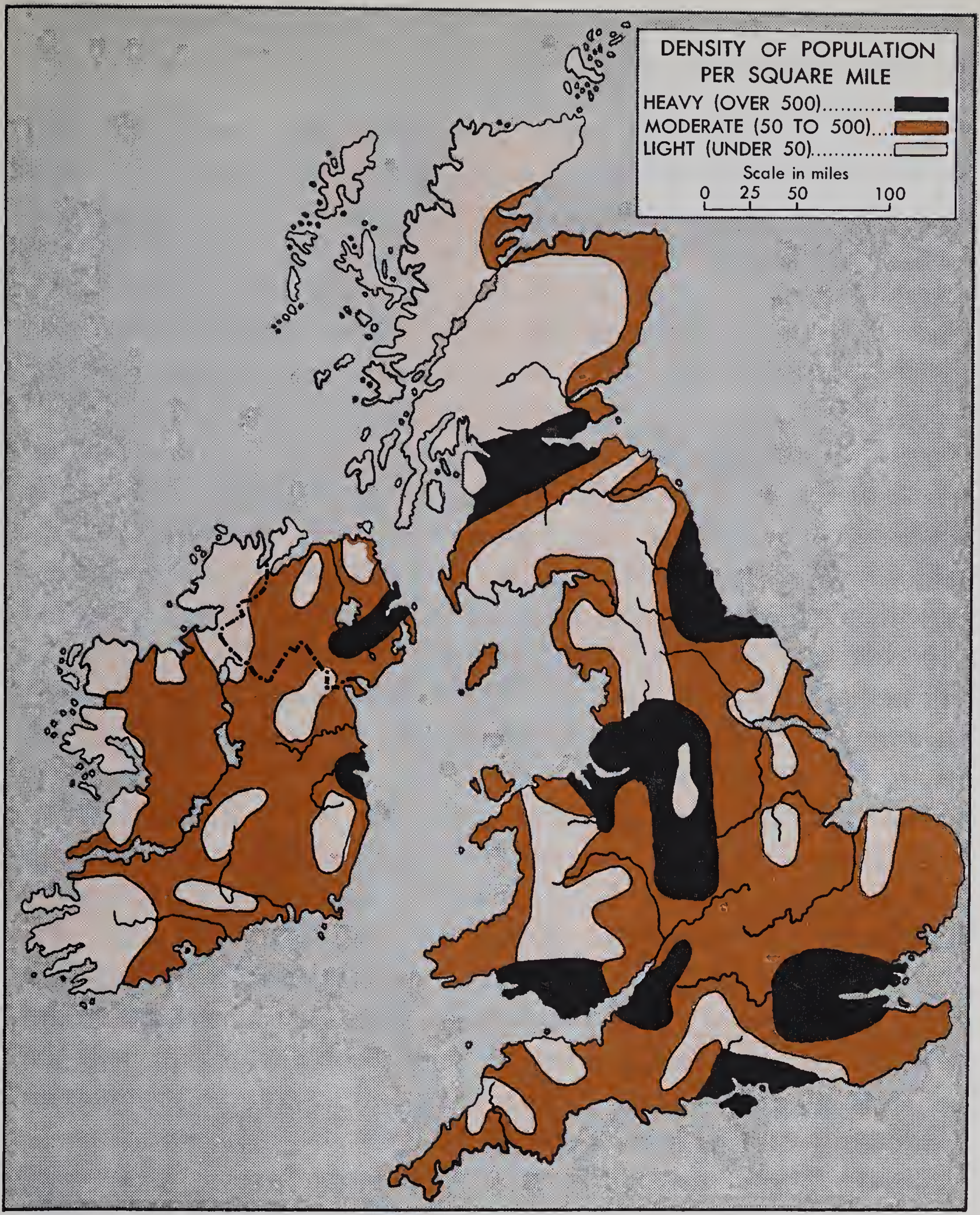
Racial Background Most of the people on the islands are white descendants of the early Celts, Romans, Norsemen, Normans, and other Europeans who came at various times to settle or conquer the islands. A small minority of negroes and orientals who emigrated from British colonies now live in the United Kingdom. On the other hand, since 1900 several million British people have emigrated to the United States and to Commonwealth countries. Over one-third of the people of Canada were either born in the British Isles or are descendants of earlier emigrants from those islands. Through her emigrants, British ideas of government, justice, religion, science, and industry have been spread to many parts of the globe where they determine the basic way of life followed in some of the world's most influential nations.

Occupations Farming occupies roughly one-half of the working force in the Republic of Ireland, and light industry employs another one-third. In Britain 40 per cent of the people are factory workers and only 5 per cent are farmers. This percentage of farm workers is the lowest found in any of the world's major countries. Canada, for example, has 15 per cent of its working population engaged in farming.

Almost one-fifth of the British people are employed in conducting the nation's business, providing telephone and other communications services, and operating the country's buses, trucks, trains, ships, and planes. Another one-twentieth of the working force is busy in power plants, mines, and quarries, supplying power and raw materials for industry and building. Construction workers make up about 7 per cent of the nation's employed, and the remaining one-quarter of the working population not accounted for above is in professional, financial, government, and miscellaneous occupations.

The living standard of the average British worker is perhaps lower than that of his Canadian counterpart but is still much higher than that of workers in most other countries. Britain's per-capita (per-person) income is surpassed in the Commonwealth only by those of Canada, Australia, and New Zealand. It greatly exceeds those of all other Commonwealth members and compares favourably with most countries outside of the Commonwealth.

Population The 57 million persons inhabiting the British Isles are unevenly divided among the political areas. The Republic of Ireland has less than three million citizens, while England's population of 44 million makes up four-fifths of all the people in the United Kingdom. Thus, the English far outnumber the 5 million Scots, 2½ million Welsh, 1½ million Northern Irish, and 100 thousand Channel Islanders. Notice that Canada's population of over 18 million is less than half that of England, but greater than the combined populations of Scotland, Wales, Northern Ireland, and the Republic of Ireland. Ranking about 75th in size, the United Kingdom stands 9th in population among the countries of the world.


DENSITY OF POPULATION PER SQUARE MILE
HEAVY (OVER 500)............ ■
MODERATE (50 TO 500).... ▨
LIGHT (UNDER 50)............. □
Scale in miles
0 25 50 100

Map 16. Distribution of Population.

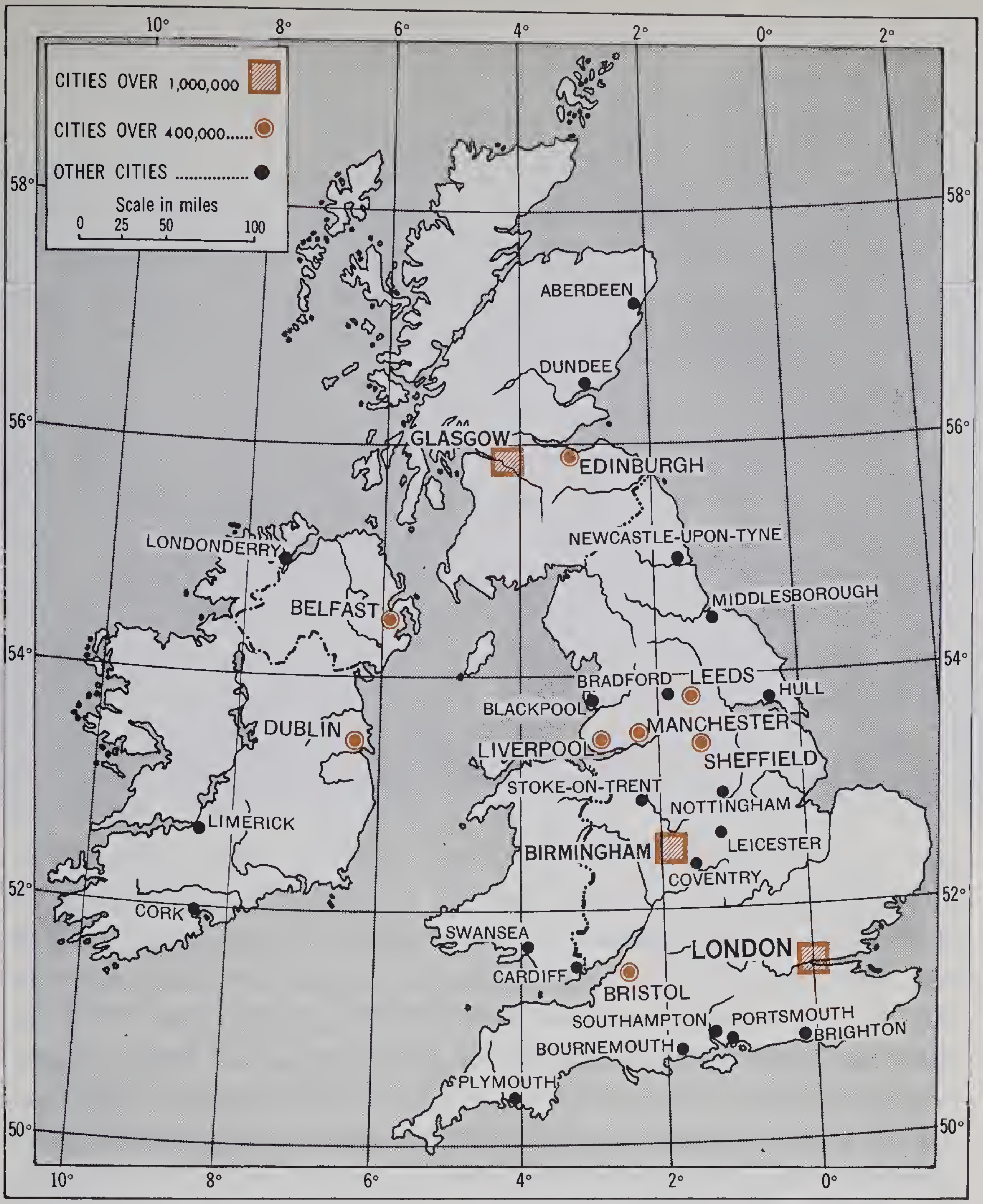
Distribution and Density — The British are fortunate that over half of the surface of their land consists of plains, the landform most useful to man. These fertile rolling plains provide land for farming, coal for power, and raw materials for building and manufacturing. So many people live on these lowlands, especially in the trading and manufacturing centres, that Britain has one of the highest population densities in the world. Only Japan, the Netherlands, and Belgium are more crowded than the United

Kingdom, which is inhabited by 575 persons per square mile. This high concentration of people is not due to a high birth rate, as is usually the case in thickly populated areas of Asia, since British families are generally smaller than even Canadian families. Rather, it has been built up gradually over the years in response to the ever increasing number of jobs provided by the development in the United Kingdom of the world's most concentrated industrial region.

Being less industrialized and having only a small amount of good cropland, the Republic of Ireland has a population density of only 104 persons per square mile. Once much larger, the number of inhabitants is still diminishing. Over one million persons who were born in the Irish Republic now live either in the United Kingdom (600,000) or in the United States (500,000). Many millions of citizens now living in these and other lands are descendants of Irish emigrants. Canada alone has almost 1½ million persons of Irish origin.

The cool, damp climate and poor soils of the highlands have made them unattractive to man. The famous Highlanders of Scotland and other upland people are gradually being drawn to the easier, more pleasant life in lowland factories and offices. Like most people who live in remote areas, those who still dwell in the highland regions of Scotland, Ireland, and Wales have kept many of their ancient customs and habits. Here are found people who still speak the Celtic languages used in Britain when Julius Caesar brought his conquering soldiers to the islands in 55 B.C.

Map 17 **Cities** Three-fifths of Britain's population live in cities with more than 100,000 inhabitants, and one-third of these urban dwellers live in Greater London—one of the world's three largest urban areas. With the exception of the London area, the most thickly populated regions in the United Kingdom are located in the neighbourhood of the major coalfields where the principal mining and manufacturing centres have grown. Consequently, the seven great population concentrations—in and around London, Birmingham, Manchester, Glasgow, Liverpool, Leeds-Bradford, and Newcastle—contain 40 per cent of the British people.


CITIES OVER 1,000,000
CITIES OVER 400,000
OTHER CITIES
Scale in miles
0 25 50 100
10° 8° 6° 4° 2° 0° 2°
58° 56° 54° 52° 50°
ABERDEEN
DUNDEE
GLASGOW
EDINBURGH
NEWCASTLE-UPON-TYNE
LONDONDERRY
BELFAST
MIDDLESBOROUGH
BRADFORD
LEEDS
HULL
BLACKPOOL
DUBLIN
MANCHESTER
LIVERPOOL
SHEFFIELD
STOKE-ON-TRENT
NOTTINGHAM
LIMERICK
LEICESTER
BIRMINGHAM
COVENTRY
CORK
SWANSEA
LONDON
CARDIFF
BRISTOL
SOUTHAMPTON
PORTSMOUTH
BRIGHTON
BOURNEMOUTH
PLYMOUTH

Map 17. Principal Cities.

Development: There is a close relationship between the availability of natural resources and the growth of cities. Location near coalfields provided fuel and raw materials that enabled such centres as Birmingham, Sheffield, and Cardiff to become large manufacturing centres. The development of the important textile cities of Manchester and Leeds was stimulated by the availability of soft, pure water and good coal. Many British port cities such as Liverpool, Belfast, and Glasgow have developed into major manufacturing and processing centres because supplies of fuel and raw materials were readily available through their docking facilities.

Cities also grew in direct response to the needs of the areas that surrounded them. Indeed, the prime function of any city is to supply the requirements of the people who live in and around it. Thus, many British cities expanded as they processed increasing amounts of products from surrounding farms and mines. Ports like Bristol and Hull were spurred in their development by the need for the processing of raw materials and fish catches unloaded in their harbours. The necessity of government administration helps to explain the growth of large capital cities such as Belfast and Edinburgh. Many cities grew because of the establishment of factories and stores to manufacture and sell the products required by those dependent upon the city for supplies. These relationships have been important in the development of the cities described below.

London — London is the great metropolis of the United Kingdom. It is the nation's capital, the leading port of the country, the banking and business heart of the land, and one of the world's principal manufacturing centres. Greater London has a population of 8,300,000; its only rivals in size and importance are Tokyo in Japan and New York in the United States. London is the chief centre in Britain for the following industries: clothing, food, drink, printing, furniture, film production, precision instruments, and many others. It is also important for chemicals and both light and heavy engineering. In fact, the London area is important for almost all the main manufacturing industries of the United Kingdom with the exception of textiles and shipbuilding.

London grew at the point closest to the mouth of the Thames that offered a good location for fording and bridging the river. Although London has been an important centre of settlement since the early Roman days, it was not until comparatively modern times that it developed into a vast metropolitan area covering almost 700 square miles and measuring 30 miles in diameter.

Several important factors contributed to its development as a great port and giant city:

1. sea-going ships, because of high tides in the lower reaches of the

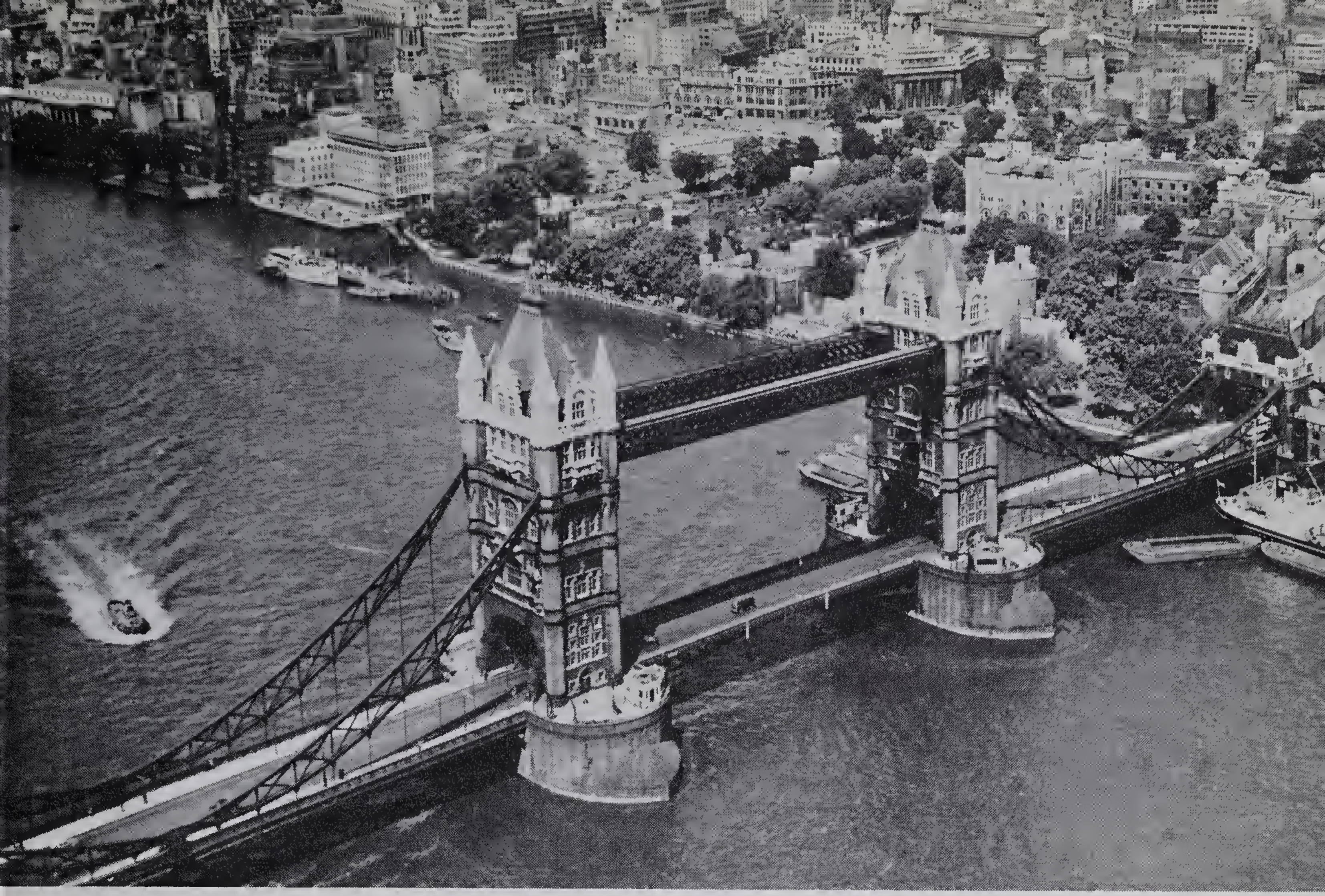


Figure 24. Tower Bridge and the City of London Skyline.
Tower Bridge, spanning the river Thames, was opened in 1894. The centre span opens to allow the busy river traffic to pass beneath. Beyond the bridge rises the mixture of old and new buildings so characteristic of London: the Tower (just across the bridge), built 900 years ago, and buildings erected since World War II.

Thames, can travel up the river to London Bridge in the centre of the city; *Fig. 24*

2. the soft nature of the soil and rocks along the banks of the Thames for several miles downstream from London has made easy the building of many large docks for ocean-going vessels;
3. the mouth of the Thames faces the industrial and commercial heart of continental Europe and provides London with a gateway to the busiest trade routes in the world;
4. as the nation's capital and chief port, London has attracted much of the country's trade and business activities;
5. the principal roads and railways were built to link London with all parts of Britain;
6. as the major city of Britain, London is the natural centre for the British Commonwealth, giving it world-wide significance.

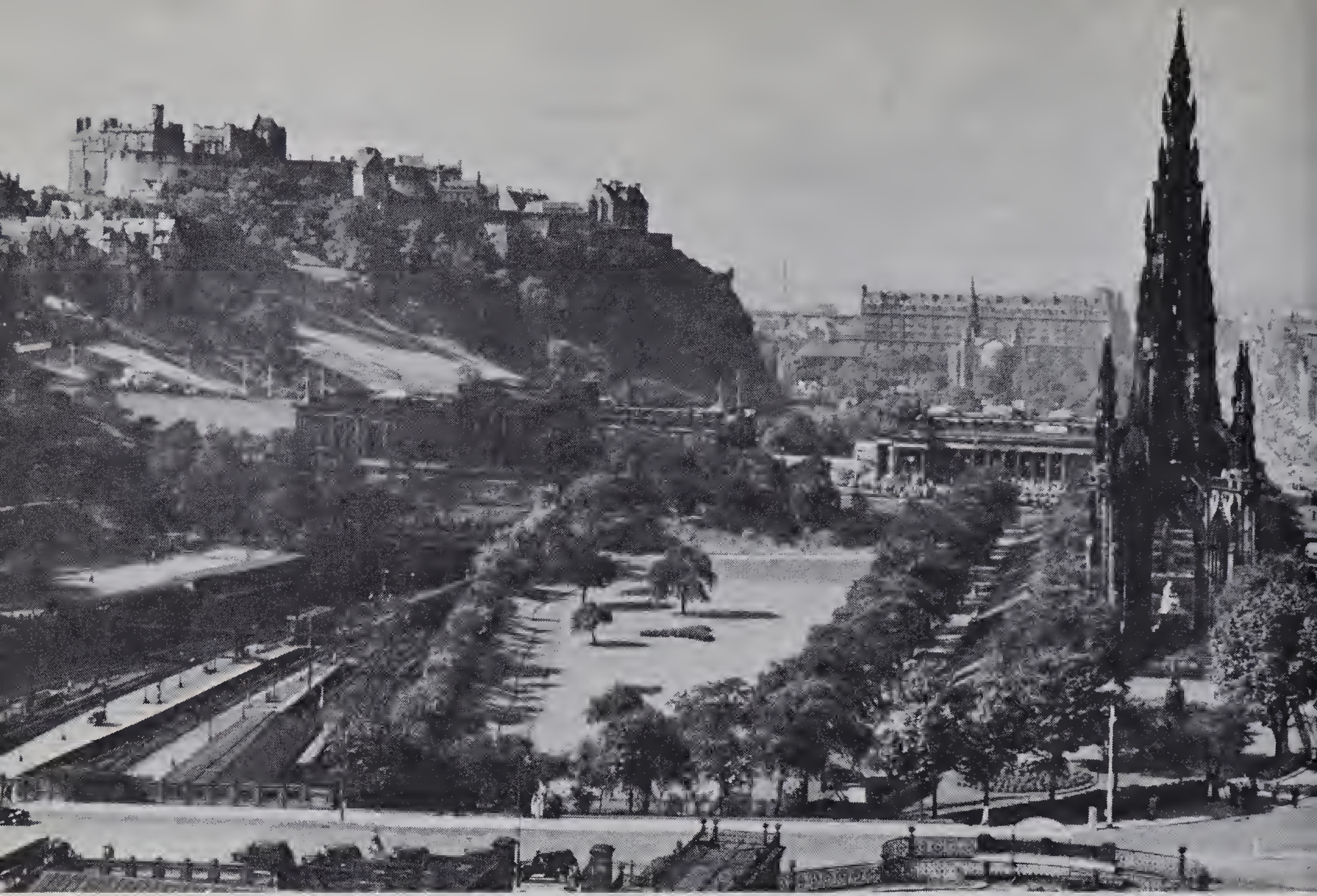


Figure 25. Edinburgh.
This gracious old city is the capital of Scotland. In the background of the picture is Castle Rock crowned with Edinburgh Castle. The early settlement grew up round this rock and castle. On the extreme right runs Princes Street, Edinburgh's principal thoroughfare.

Birmingham — (1,112,000) is the great industrial centre of the Midlands. It manufactures iron ware, metal goods, household utensils, electrical apparatus, jewellery, cycles, cars, rubber products, and a great list of miscellaneous articles.

Glasgow — (1,085,000) is the largest city in Scotland. Its location at the head of ocean navigation on the Clyde River and close to local supplies of coal have made it a principal port and an iron and steel, shipbuilding, marine engineering, and textile centre. The Clyde estuary is the greatest shipbuilding area in the world.

Liverpool — (780,000) is a great port which imports most of the cotton used in Lancashire. It is second only to London in the processing of food; and ship-repairing, electrical engineering, and the manufacture of heavy industrial equipment are also important.

Manchester — (692,000) is the centre and market for the great cotton industry of Lancashire. The city also has a variety of industries, especially electrical and heavy engineering and the dyeing of fabrics. It is linked with the sea by the Manchester Ship Canal which allows it to stand fourth in value of trade among the ports of the United Kingdom.

Edinburgh — (470,000) is Scotland's capital and second largest city. It is a port and educational centre with printing and the processing of foodstuffs as its chief industries. *Fig. 25*

Belfast — (450,000) is the capital and only major city of Northern Ireland. As one of Britain's principal ports and an active manufacturing centre it specializes in shipbuilding, marine engineering, aircraft assembly, and the manufacture of linen, rope and tobacco.

Canada's two major cities of Greater Montreal (2,110,000) and Greater Toronto (1,824,000) are larger than all British cities except London, but the United Kingdom has many more large cities than Canada. In all, the British Isles have 16 cities with more than 250,000 citizens compared with 9 in Canada.

Dublin — (535,000) is the capital and only major city of the Republic of Ireland, whose population is mainly rural. *Cork* — (77,000) and *Limerick* — (51,000) are the only other cities of any significant size in the country. Dublin serves as the main port for the agricultural Central Plain of Ireland, and its light industries process foodstuffs and manufacture personal and household goods.

TRANSPORTATION AND COMMUNICATIONS

THE UNITED KINGDOM

Great Britain has the most efficient transportation system in Europe. Most of the passengers and goods received or sent out of Britain travel by ocean-going ships with only a small percentage carried by airplanes. Within the country, traffic is primarily carried by road and rail, inland waterways being of only secondary importance. Excellent communications are provided by the post office, telegraph, telephone, radio, television, and newspapers.

The Merchant Navy The United Kingdom has the largest active merchant marine. Over 6,000 ships, manned by more than 150,000 sailors, handle one-quarter of the world's passengers and goods. Approximately two-thirds of the imports and three-quarters of the exports of the British Isles are carried in British ships. The main emphasis now is on the building of oil tankers and specialty ships for carrying metal ores, sugar, and grain. The few ships that are over 30,000 tons are passenger ships. These include some of the world's largest and most luxurious passenger liners. Most British ships are now propelled by diesel engines, although steamships burning oil are still numerous. Just as oil has largely replaced coal as fuel for ships, perhaps atomic power will someday replace oil as the chief marine fuel. A few nuclear-powered ships are already underway with several more planned for the future. About 150,000 dockworkers in 300 British ports look after the loading, warehousing, and unloading of cargoes. The main ports are, in order of importance: London, Southampton (which handles more passenger traffic than any other port in Europe), Liverpool, Glasgow, Belfast, Manchester, and Hull. Other large ports include Newcastle-upon-Tyne, Bristol, Swansea, and Dublin. *Fig. 7*

Railways Britain has 51,000 miles of track, about the same track mileage as Canada with its much greater area. This gives the United Kingdom more railways per square mile than any other country, except Belgium. The railways carry one-quarter of all inland freight and perform the vital service of carrying passengers from suburbs to the centres of large cities. Nearly 600,000 people work for the railways, which are government owned. The vast traffic is handled by about 18,000 locomotives and well over a million cars and coaches. Most of the locomotives are coal-burning steam engines, but modernization to diesel and electric-powered engines is gradually taking place.

Road Transport Great Britain has the highest density of traffic in the world with nearly eight million motor vehicles using 200,000 miles of roads. Over 70% of all inland transport is carried by road vehicles of which about one-half are cars, one-fifth trucks, and one-fifth motor cycles. Only some mountainous areas of Scotland, Wales, and Ireland do not have roads of high quality.

Inland Waterways Because the rivers and old canals are too narrow and shallow for present-day ships, the waterways of Britain are now used more for recreation and water supply than they are for commercial transportation. Exceptions to this general rule are the Manchester Ship Canal, the only one built since 1840, and a few rivers such as the Trent and Severn. Hence, most of the vessels using British waterways are small ships with cargo capacities of less than 400 tons. Only about one-half of the 2,600 miles of canals and navigable rivers are used for carrying commercial cargoes such as coal and fuel oil.

Airways The government-owned British Overseas Airways Corporation (B.O.A.C.) and British European Airways (B.E.A.) handle 80% of the air traffic, leaving the remainder to be handled by 20 independent companies. Of the one hundred British airports, London is the most important. Other important terminals for overseas traffic are at Prestwick in Scotland and Shannon in Ireland.

Radio and Television The British Broadcasting Corporation (B.B.C.) controls and broadcasts non-commercial radio and television programmes in Great Britain. In addition, the Independent Television Authority was established in 1955. Under this authority, privately-owned stations were set up on which time is sold to commercial advertisers in the same way as on United States and Canadian networks. Television has been available to the public since 1936, and programmes of generally good quality are now seen on 15 million sets.

The Press More newspapers per person are sold each day in Britain than anywhere else in the world. One British paper holds the world's record of eight million copies sold in one day, and seven other daily papers have circulations in the millions per day. There are about 300 daily papers and 1,300 weeklies in the United Kingdom.

THE REPUBLIC OF IRELAND

Since Ireland has fewer large population centres and much less need of commuter and industrial transportation than the United Kingdom, Irish roads, railways, waterways, and airlines are much less developed than those of Britain. Irish ships and planes are of very minor importance in international transport. The limited commercial activities and generally low standard of living which prevail in the republic have left Ireland much retarded in the use of telephones, television, and telegraph. However, radio sets and mail service are common throughout the country.

TRADE

THE UNITED KINGDOM

The United Kingdom ranks second in world trade, being surpassed only by the United States. This position has been made possible by the combination of large coal deposits, millions of skilled industrial workers, and a good location for sea transportation. The first two factors enabled the United Kingdom to build a vast system of manufacturing plants that supply a surplus of goods to be sold to other nations. The island location provided numerous excellent harbours and encouraged the development of a large fleet of merchant ships to carry British goods to foreign lands.

Britain's economy is more dependent upon trade than is the *Fig. 26* economy of any other nation. One half of the food, nearly all the industrial raw materials, and all fuel (except coal) consumed in Britain, must be brought from other countries. To pay for these vital imports, Britain sells machinery, textiles, metal goods, chemical products, and all types of transportation equipment.

Map 10 The only major resource found in adequate quantities within the borders of the United Kingdom is coal. Although fertile and well-managed, the orchards and croplands are too limited in area to provide enough food for the more than 50 million inhabitants, so large quantities of fruits, wheat, and other cereals must be imported. The cool, temperate winters make it impossible to grow tropical and sub-tropical products, and so bananas, pineapples, oranges, tea, coffee, sugar, tobacco, cotton, rubber, and many other agricultural products of warmer lands must be imported. Although the livestock industry of Britain produces large quantities of meat, dairy products, and wool, production is not adequate to meet the nation's requirements of food and textile raw materials. Imports meet these

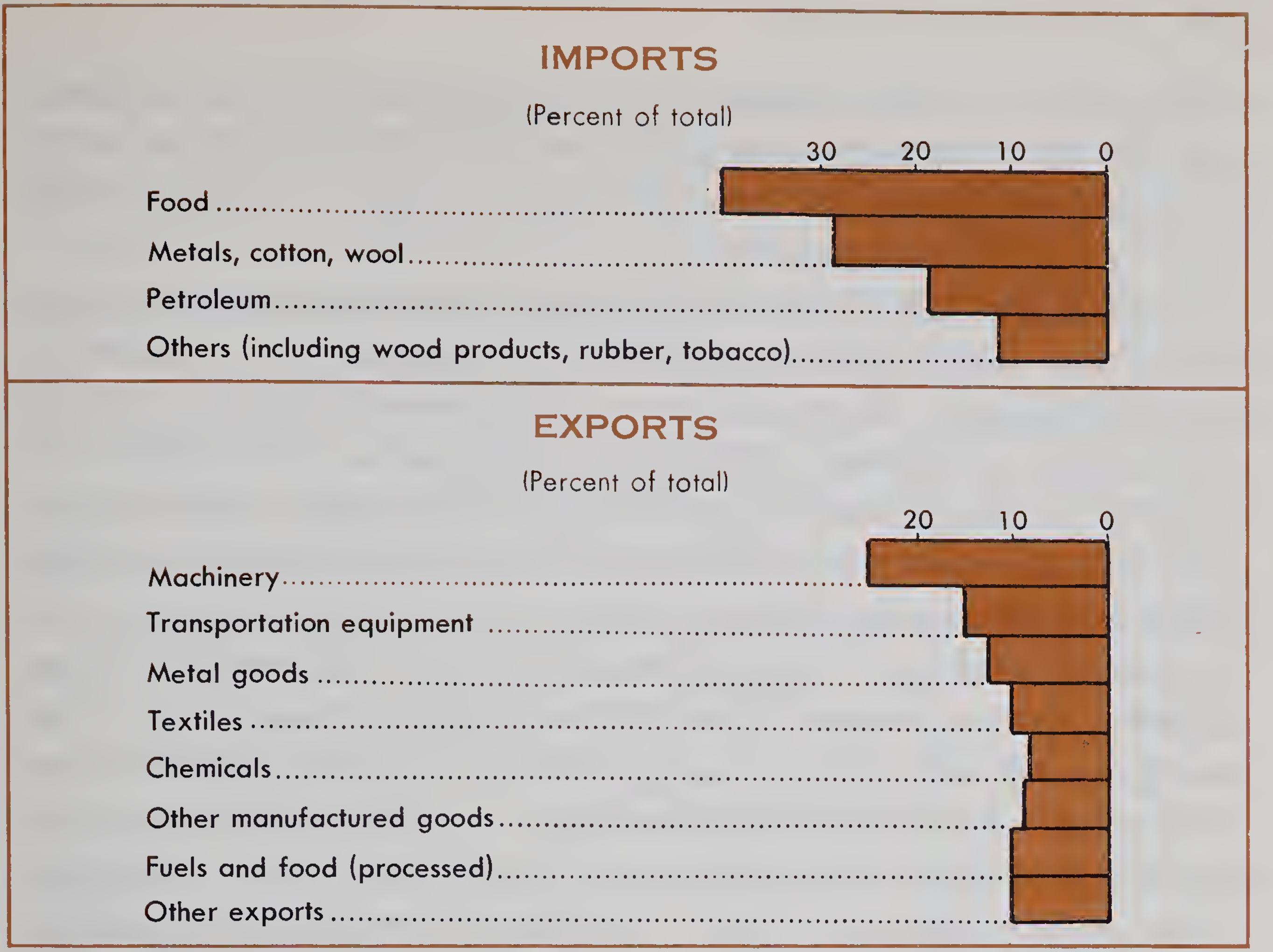


Figure 26. Imports and Exports.
The United Kingdom has a small area and a large population inhabiting it. As a consequence, most of the imports are raw materials which can be processed. Exports consist almost entirely of manufactured goods.

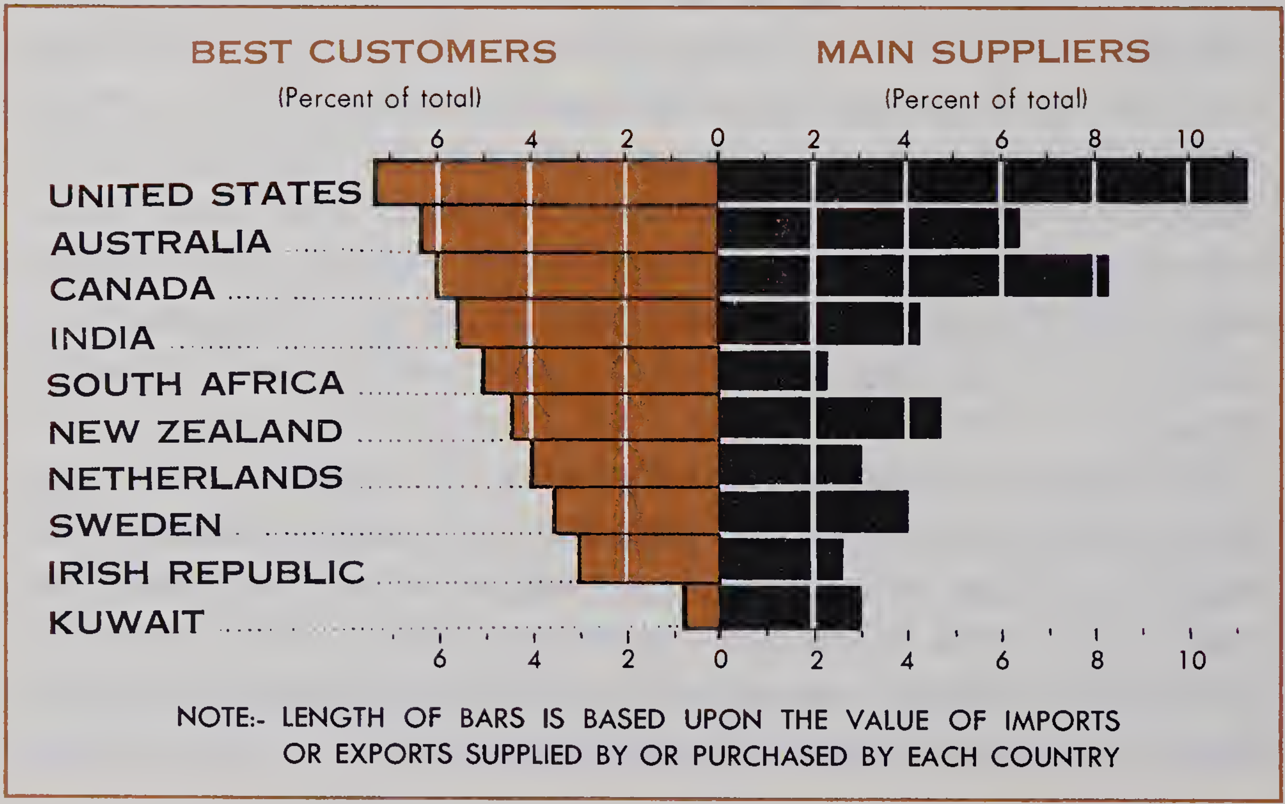
shortages. Occupying less than seven per cent of Britain's small area, the forests are totally inadequate to meet Britain's need for timber. Britain's mines supply only about half of the iron ore and practically none of the metals which her many metal-using industries require. Petroleum, an indispensable necessity in a country with so many transport vehicles driven by diesel oil and gasoline, is almost totally lacking and must be purchased in vast quantities abroad.

The resource which makes it possible to overcome these staggering shortages is its people. Their industrial skills, combined with engineering experience and sufficient capital to build efficient industrial plants, allow Britain to buy comparatively inexpensive raw materials like rubber, cotton, wool, iron ore, and metals, and manufacture them into expensive finished goods like tires, cloth, clothing, machinery, and motor vehicles. It is the difference between the price paid for imported primary products and the selling price of exported manufactured goods that enables Britain to pay for many of the imports that she must have.

Since food, fuels, tobacco, and many other imports are not processed into more valuable goods for export, but are consumed by the British people themselves, the money spent for them is a drain on the national economy. They add nothing to the value of Britain's exports, yet they must be paid for in money obtained in foreign countries. This is one of Britain's most serious problems. Goods purchased in a foreign country must, at some point, be paid for in the currency of that country. Britain obtains much of the foreign currency that she needs to pay for her imports from the export of vast quantities of manufactured goods, but, since the total value of the products she imports is greater than the value of the goods she exports, she must have other ways of earning foreign currency to make up the difference in value. A further discussion of this problem will follow in a later section.

Fig. 27 Britain's best customers and suppliers are the United States, Canada, and Australia. Britain is not overly dependent upon any one

Figure 27. Customers and Suppliers.



NOTE:- LENGTH OF BARS IS BASED UPON THE VALUE OF IMPORTS OR EXPORTS SUPPLIED BY OR PURCHASED BY EACH COUNTRY nation for its trade in the way that Canada relies so much on its trade with the United States. Such a variety in trading partners is fortunate for Britain. Her trade with any one country can be cut off without seriously affecting her total exports and imports.

Special tariff arrangements stimulate trade between Britain and Canada. A wide range of Canadian products is allowed to enter Britain under Commonwealth preference tariffs. In many cases, this means that they are admitted free of duty, and in other cases, Commonwealth products are subject to a preferential rate of duty. The preferential tariff system allows many goods to move between Commonwealth members at much lower tariffs than are charged against goods imported from non-Commonwealth members. British importers, therefore, prefer to buy from Canadian and other Commonwealth sources if possible. These special tariff arrangements greatly increase British imports of Canadian farm, forest, and mineral products. Next to the United States, Britain is Canada's chief trading partner. Normally the British buy about one-seventh of our exports and supply about one-eighth of our imports.

The Commonwealth preference system may be seriously weakened if Britain is successful in its present attempt to join the European Common Market (E.C.M.). The Common Market is a trading bloc whose member nations are France, West Germany, Italy, Belgium, the Netherlands, and Luxembourg. The official name of this organization is the European Economic Community (E.E.C.). Its purpose is to lower tariffs and other trade barriers among the member nations. with the long-term aim of creating a huge, free-trade area. The members have already decreased their tariffs against each other. The results of this policy have been so successful that Britain is trying to join the Common Market. The European Common Market countries are developing a common tariff to be applied to all imports into the E.C.M. from non-member nations. If Britain joins the Common Market, Commonwealth preferences in the British market may be lost or seriously changed, and as a result, British purchases of Canadian and other Commonwealth goods may decrease sharply.

THE REPUBLIC OF IRELAND

Ireland's position in the field of international trade is very different from that of the United Kingdom. Being primarily an agricultural country with a small population and very little industry, Ireland has no huge output of manufactured goods for export as does highly industrialized Britain. On the contrary, her small, often poor, farms produce only a modest surplus for export. Thus, while Britain conducts ten per cent of world trade, the Republic conducts a great deal less than one per cent.

Because Britain transacts so much business with other countries, Irish trade is comparatively unimportant to the United Kingdom. But Ireland's foreign trade is dominated by Britain. Over half of the Republic's imports come from the United Kingdom, and Britain buys four-fifths of Ireland's exports. Agricultural Ireland imports manufactured goods, feed for livestock, fuels, and timber, and exports food products from its many farms.

PROBLEMS

THE UNITED KINGDOM

The necessity for Britain to pay out more money for the food, raw materials, and fuel that she must buy from foreign countries than she receives from the sale of her manufactured goods to other lands creates one of her most serious problems. For the same reason that an individual cannot continually spend more money than he makes, a nation cannot continually pay more for its imports than it receives for its exports without finding some way to make up the deficit. Canada often has this problem because she buys so much from other countries, especially from the United States. The United Kingdom pays for its trade deficit in several ways. (1) British freighters earn foreign currency carrying goods for other countries. (2) Money invested by British individuals and companies in mines, factories, plantations, and other projects in foreign countries brings profits to Britain. (3) Banks and insurance companies in the United Kingdom receive payments for services provided for people and companies in foreign countries. (4) In addition, over one million tourists bring several hundred million dollars to Britain each year.

When British tourists spend money in a foreign country, the money can be used to pay for some of the goods Britain sells to that country. In having to accept this money in payment for British exports, the United Kingdom loses an opportunity to earn some foreign currency that could be used to pay for purchases made from that country. To limit this type of loss, the government has, at times, restricted the amount that British tourists and emigrants might take to other countries. Canada has a similar problem, and may someday have to adopt restrictions on money spent in other countries by Canadians.

Many countries of the world use the British pound sterling as the basis of their money. Britain is the central banker in this "sterling area" which contains about one-quarter of the world's population. Since roughly one-half of all international trade is conducted in sterling currency, the British banks that provide services to exporters and importers of many lands in the sterling area earn a substantial amount of income for the United Kingdom.

By combining the income received from its exports and from the various other methods of earning foreign money, the British are able to pay for the tremendous volume of goods that must be purchased abroad. However, it is obvious that this trade deficit puts Britain under constant pressure to maintain all types of income from foreign sources. Any serious loss of income immediately places the island kingdom in a serious financial position. Its leadership in manufacturing and world trade must be maintained or the United Kingdom will have to reduce either its population or its standard of living and sink to the status of a minor nation.

Lack of sufficient natural resources is the basic cause of the trade deficit and will always hamper Britain's effort to become more prosperous. Canada has within its borders huge supplies of coal, petroleum, natural gas, water power, iron ore, metals, forest products, and food. The savings that Canada makes by not having to buy her total requirements of these products from other countries gives Canada a tremendous advantage that Britain does not have. The problem is made more critical by the steady reduction in value of the two main resources now found in Britain. Intensive mining over a long period of time has used up the most accessible deposits of good quality coal and iron ore. Increased mining costs and eventual depletion of all useful deposits faces Britain within the next two hundred years. However, it is hoped that, before then, atomic power will be supplying the fuel needed to run a modern industrial nation like Britain.

Competition from other leading manufacturing countries in world markets is a major source of concern in Britain. We have seen that Britain must export its manufactured goods to maintain its standard of living, so that anything which reduces its ability to sell to other countries is serious. The United States, Germany, Japan, and the Soviet Union are sometimes able to produce more cheaply or more expertly certain manufactured goods traditionally made in the United Kingdom. When this happens, as in the case of Japanese shipbuilding, Britain loses some business to its competitors. This continuous threat of lost markets complicates the problem of paying for imports.

In the sense that the land of Britain is unable to support its population without huge imports, it is overpopulated. Constant efforts are being made to encourage emigration to other lands to improve this situation. Commonwealth countries like Canada, Australia, and New Zealand, with living conditions similar to those in Britain, are the favourite destinations of most British emigrants.

A more terrifying problem than the trade deficit is Britain's perilous position in the atomic age. A few well-placed hydrogen bombs or inter-continental ballistic missiles could wipe out the entire population of a nation so limited in area. The surrounding waters which have saved Britain from successful invasion for so many centuries offer no protection against the threat of nuclear attack.

The problems facing Britain are difficult, but her future remains bright. The skill, inventiveness, and ambition of her people will help to overcome her difficulties and will help to assure Britain a prominent place among the nations of the world.

THE REPUBLIC OF IRELAND

The economy of the Republic of Ireland is handicapped by overdependence upon a farming industry which is plagued by poor soils and uncertain weather. From time to time, Ireland experiences periods of generally cool, cloudy weather which last for several years. During these periods, the growing of many cereals is impossible, and the potato crop is reduced. Since most Irishmen depend on small farms to supply their basic needs, any such reduction in farm production causes much hardship and even severe food shortages.

Lacking any abundant natural resources, and with few industrial fuels, raw materials, and skills, Ireland has not been able to develop a large prosperous manufacturing industry. Without such industry, Ireland's economy is not a stable one, and her standard of living is low compared with those of most western European and North American countries.

Purchase of three quarters of the nation's exports by one customer—Great Britain—is a potential problem for Ireland. Relations between the Republic and Great Britain are often strained because many Irishmen remember with bitterness the days when Britain ruled Ireland and resent Britain's firm refusal to surrender Northern Ireland to the Republic. Should these unsatisfactory relations ever cause Britain to stop buying Irish exports, Ireland's trade position would be very seriously affected.

WORK UNIT 5

The Language of Geography Add to your reference list definitions of the following terms: (Transportation and Communications) Merchant Marine, B.O.A.C., B.B.C.; (General) tropical products, internal trade, population density, British pound.

Problems and Projects

1. When Canada and Britain have similar railway mileages, why do they not have the same pattern of railways?
2. Indicate on an outline map of the world the countries which are (a) Britain's main suppliers and (b) Britain's best customers.

3. On an outline map of the world, shade in all areas that have over 500 persons per square mile.
4. Why does the United Kingdom with its small area have so many more people than Canada with its huge area?
5. Construct a bar graph to show the relative size of the largest occupational groups in Britain.
6. Why does the British government want its imports and exports to be carried in British ships?
7. Using a map in a good atlas that shows railway density for the world, compare the density of railways in the British Isles with the density in (a) Canada, (b) United States, and (c) Brazil.
8. How has the United Kingdom, with its few natural resources, become a prosperous nation?
9. Explain the factors that have made the population of the United Kingdom (a) large and (b) unevenly distributed.

Maps

1. Mark the largest cities of the British Isles on an outline map.
2. Prepare a simplified population density map of the British Isles, emphasizing, by the use of colour, the most densely populated areas.

REVIEW QUIZ—BRITISH ISLES

A few of the statements below are TRUE, but most of them are FALSE. Copy all the TRUE statements into your notebook. Make all the FALSE statements into TRUE statements by correcting the underlined word or phrase.

1. The British Isles are about ⅕ the size of Canada.
2. The Welsh Highlands is the highest range of mountains in the British Isles.
3. The United Kingdom can provide most its own food.
4. Long, narrow, deep bays on the British west coast are called fiords.
5. Most English rivers flow in a westerly direction.
6. The Thames is the longest river in England.
7. Spring is the driest season in the United Kingdom.
8. Britain's chief agricultural crop is rye.
9. The most influential factor affecting Britain's climate is the elevation of the land.

10. The best fishing grounds off the British Isles are the Grand Banks.
11. Most iron ore mined in England is of a high quality.
12. Kaolin is used to harden steel.
13. The largest industry in the British Isles is mining.
14. The main iron and steel production areas of the British Isles are in North Wales, Northwest England, East Midlands, and Cheshire.
15. The city most noted for its excellent steel is Sheffield.
16. The making of cotton yard goods is Britain's oldest staple industry.
17. The Thames and Mersey estuaries have become the two main centres of the British chemical industry.
18. In Britain, 30% of the people are factory workers.
19. The British Isles have the second highest density of population in the world.
20. Three-fifths of Britain's population live in cities.
21. British mines provide most of the metals required for British industries.
22. The most important natural resource in the British Isles is the British people.
23. Britain's best trading customers and suppliers are China, India, and Argentina.
24. Transportation equipment is Britain's second largest export.
25. There are no oil deposits in the British Isles.

The Commonwealth in Africa

The Commonwealth is well represented on the African continent. Five independent member nations and several British-controlled territories together occupy a large part of Africa. A study of the "Commonwealth in Africa" map will reveal the size and location of each of these countries. The independent members are Sierra Leone, Ghana, Nigeria, Uganda, and Tanganyika. Several of the countries that are still administered by Britain have local self-government and may soon have complete independence. Before studying the individual countries of the Commonwealth, however, it is desirable to review the whole continent of Africa. In this way, a better understanding of the geographical factors that affect the Commonwealth in Africa will be obtained. *Map 8*

Until recent times, Africa was known as the "dark continent". Central and South Africa were ruled by the primitive negro tribes who were native to these areas. The coastal areas of Africa had long been known, and trading colonies were founded at various places. There was some European settlement in South Africa, but, in much of its interior, travel in Africa was so unpleasant, difficult, and dangerous that non-Africans avoided it and, consequently, knew very little about it. As a result, and despite its nearness to Europe, more distant areas, such as North America, South America, Australia, and New Zealand, were explored and partly settled before Europeans finally penetrated the interior of Africa in the 19th century.

The development of modern transportation has opened up most of the continent. Airplanes and motorized vehicles have enabled the white man to explore and develop the previously forbidding interior of this vast land mass.

Today Africa is an important source of minerals and of many agricultural and forestry products, but it is still far behind the other inhabited continents in the development of industry, trade, transportation, communications, education, and medicine. Because of this, the standard of living of the average African is extremely low.

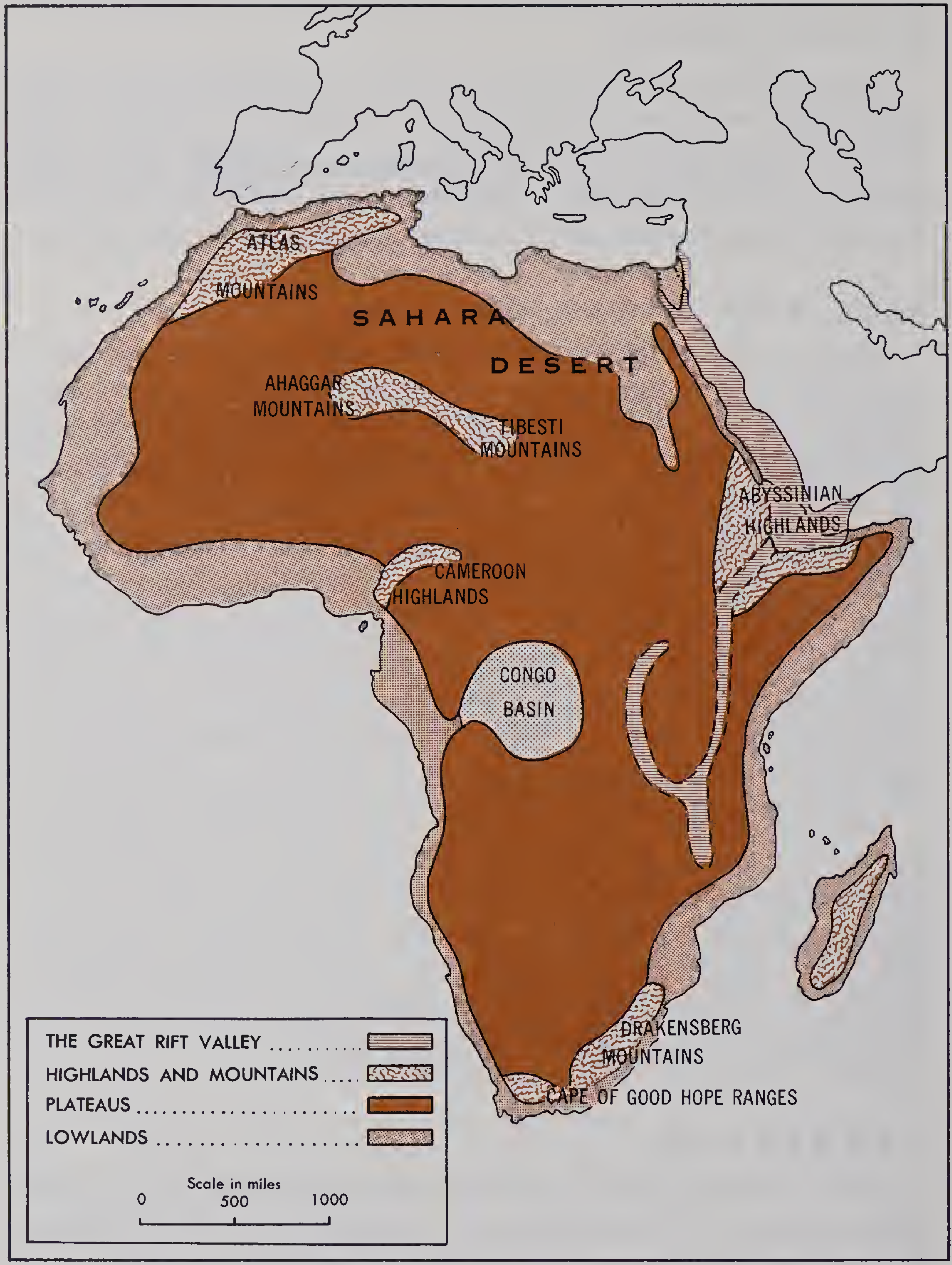
SIZE AND LOCATION

Africa is the world's second largest continent. Its huge area of more than 11½ million square miles makes it three times as large as Canada, and second only to Asia among the continents. Extending more than 37 degrees north and 34½ degrees south of the equator, the continent has a total length of roughly 5,000 miles, or approximately one-fifth of the distance around the world. Almost as great as its length is its maximum width of 4,600 miles, which lies between 17½ ° West and 51½ ° East. This huge width is reached only in the north where the continent is much wider than in the south. Like South America, Africa is roughly triangular in shape, and so two-thirds of its area lies north of the equator. Being crossed by the equator, most of the continent lies in the path of the trade winds. *Map 8*

Like the British Isles, Africa was joined to the continent of Europe thousands of years ago but was separated from it when the connecting sections of land sank below sea level and were flooded forming the Mediterranean Sea and the Straits of Gibraltar. However, Africa did not become an island by this parting from Europe because it is still joined to the Sinai Peninsula of Asia by the Isthmus of Suez, which is 80 miles wide.

LANDFORMS

Map. 1 Most of Africa consists of a series of plateaus with level or gently rolling surfaces, seldom broken by outstanding natural landforms. Underlying this immense plateau, is a great block of ancient rocks which has resisted earth movements for so many tens of millions of


ATLAS MOUNTAINS
SAHARA DESERT
AHAGGAR MOUNTAINS
TIBESTI MOUNTAINS
ABYSSINIAN HIGHLANDS
CAMEROON HIGHLANDS
CONGO BASIN
DRAKENSBERG MOUNTAINS
CAPE OF GOOD HOPE RANGES
THE GREAT RIFT VALLEY
HIGHLANDS AND MOUNTAINS
PLATEAUS
LOWLANDS
Scale in miles
0
500
1000

Map 1. Landforms.

years that very few mountains rise out of the plateau. Like the Canadian Shield, this rigid block consists of very old igneous and metamorphic rocks which contain many deposits of valuable minerals. Millions of years of erosion have created layers of sedimentary rocks which cover about two-thirds of the ancient bedrock. The newer sedimentary rocks are also rich in minerals and contain valuable deposits of coal and oil which do not occur in the older rocks.

While levelling most of the surface of the plateau, the agents of erosion (wind, rain, running water, temperature changes, natural chemical solutions, and plants) had the opposite effect in areas where soft and hard rocks originally stood at the same level. Here, the softer rocks were worn away, leaving the more resistant, hard rocks above the level of the surrounding land in the form of mountains or mesas. The latter are flat-topped sections of the plateau left standing above the general level of the surface by the erosion of less-resistant land around them. Mesas are common features on most parts of the plateau and are especially prevalent in the south.

The edges of the plateaus seldom reach the oceans; they rise in the form of steep cliffs (or escarpments), leaving only a narrow coastal plain in most areas. In relation to area, Africa has less lowland plain than any other continent.

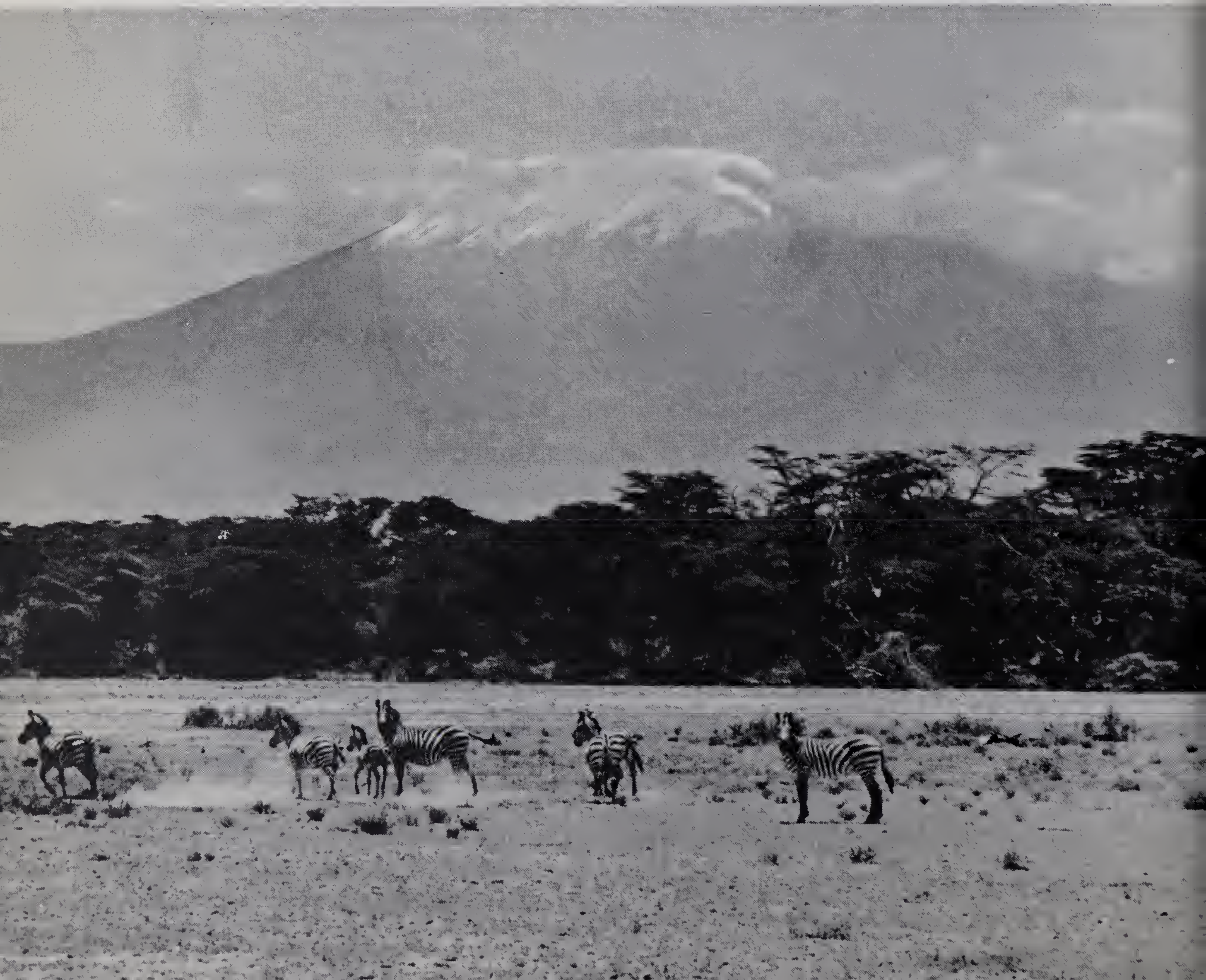
North Africa: In the northwest, the hard outer crust of the earth has crumpled to form the Atlas Mountains and some associated ranges. Rising to a maximum height of 13,671 feet in Morocco, these ranges continue into Algeria and on to Tunisia, where they gradually diminish in size until they fade out before reaching the Mediterranean. The rest of North Africa, which consists mainly of the Sahara Desert, is a low plateau lying between 500 and 1000 feet above sea level with only a few areas rising over 3,000 feet. The main interruptions in the generally low surface are the Ahaggar and Tibesti Mountains, which rise out of the Mid-Sahara.

Map 2

Central Africa: The western half of Central Africa consists of the saucer-shaped Congo Basin, which is only 1000 feet above sea level in the centre but rises to 3,000 and 4,000 feet around its outer rim. To the northwest of the Basin, near the Gulf of Guinea, an active volcano, Cameroon Mountain, towers to 13,350 feet.

Two high plateaus, with many lofty mountains rising above them, command the eastern half of Central Africa. In the north, the Abyssinian Plateau consists of hardened lava that once flowed out of great cracks in the earth's crust. To the south, the lower Central East Africa Plateau is broken up by deep troughs called rift valleys that are flanked by high volcanic mountains. These valleys and the volcanic activity of the region resulted from the cracking (or faulting) of the earth's hard outer crust. When two parallel cracks occurred, the land between them slipped down to form long, deep, steep-sided valleys with flat floors. (i.e. rift valleys like the Central Valley of Scotland). Of the two main valleys created in this way,

Figure 1. Mount Kilimanjaro.
This beautiful volcanic cone situated in northern Tanganyika is the highest mountain in Africa. The zebras in the foreground are roaming a large game reserve in southern Kenya.



the eastern one is the more extensive. It stretches from Israel in the north to Lake Nyasa in the south. Several sections of it are occupied by waters, including the Dead Sea, Gulf of Aqaba, and the Red Sea outside of Africa, and Lakes Rudolf and Nyasa within the borders of the continent. A western rift valley, which runs northward from the upper end of Lake Nyasa, is occupied by Lakes Tanganyika, Edward, and Albert. Between the eastern and western rifts the land has partially collapsed to form the Lake Victoria basin. Thus, of the many large lakes located in East Africa, only Lake Victoria does not occupy a rift valley. Such high volcanic peaks as Mt. Kilimanjaro (19,320′) which is still active, Mt. Kenya (17,040′), Mt. Ruwenzori (16,791′), and Mt. Elgon (14,176′) that border the rifts are associated with the large earth movements which created these strange depressions. *Map 1* *Fig. 1*

South Africa: Actually a southern extension of the eastern tablelands described above, the plateau of South Africa is much higher than that of North Africa. Only a few low mountain areas interrupt the surface of the southern tablelands, but a gentle warping of the plateau has tilted the eastern edge upwards to form the Drakensberg Mountains, which rise to a maximum height of over 10,000 feet.

In the extreme southwest, the Cape of Good Hope Ranges, like the Atlas Mountains in the North, were formed by the crumpling or folding of the earth's crust. However, they are only about half as high as the Atlas ranges because they are much older and have been exposed to erosion for a longer time.

To summarize, we see that most of Africa is in the form of a plateau which is higher in the east and the south. Major mountain ranges occur in the extreme Northwest, the South, and in the volcanic regions of East Africa. The cliffs which mark the edge of the plateaus usually lie close to the seas, leaving narrow coastal plains.

Coasts With few inlets and no deep bays to penetrate into the heart of the land mass, Africa has the least indented coast of all the continents. Estuaries are also rare, the Congo being the only major river to have a drowned mouth. So smooth and unbroken is the coast that much of the interior is a long distance from the sea, some areas being more than 1000 miles inland.

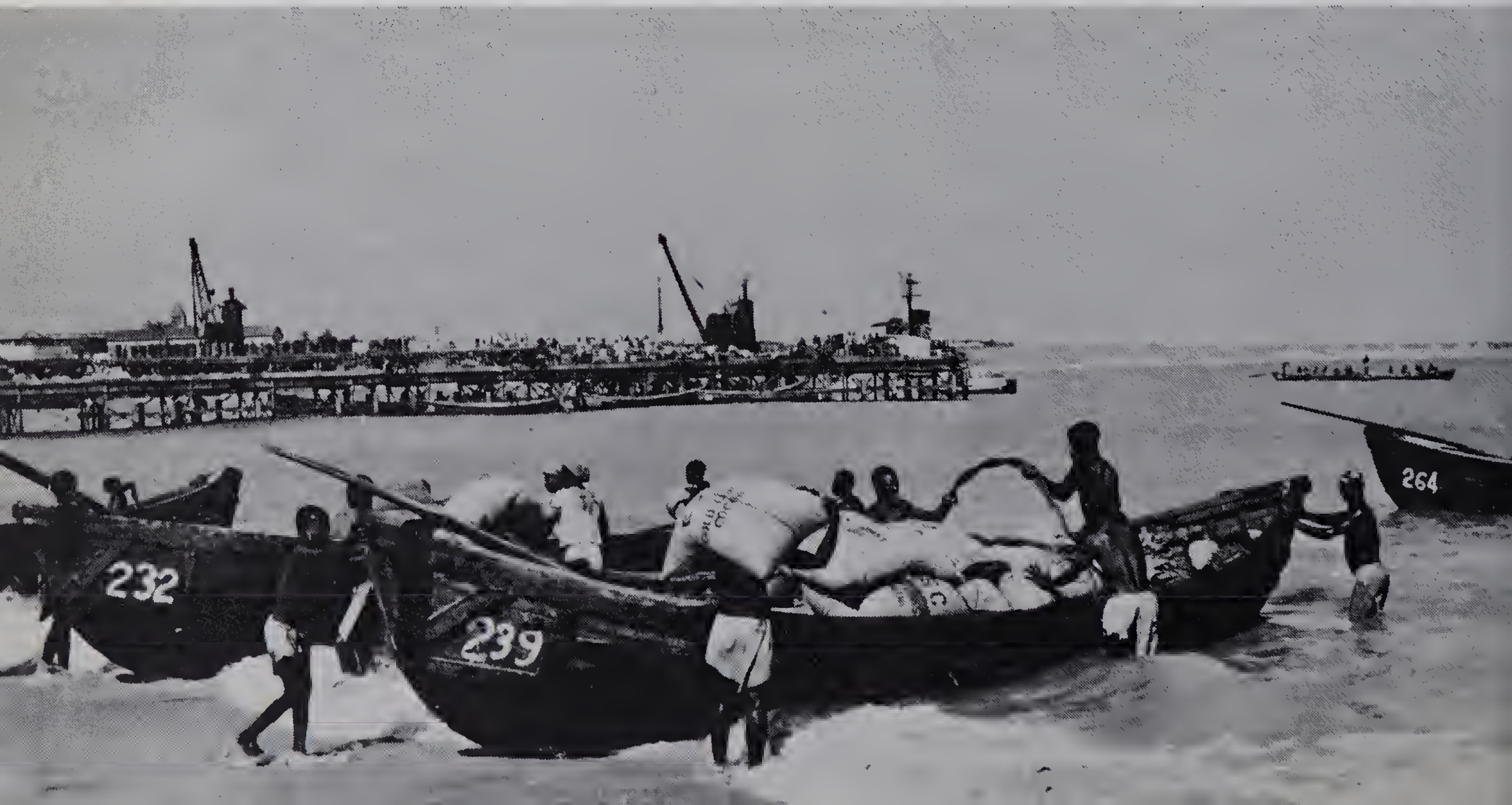
The lack of indentations makes the 16,100-mile length of the coastline short in proportion to the area of the continent. Although three times as large as Europe, the continent of Africa has a coastline four thousand miles shorter than the deeply indented European coastline.

The shortage of deep bays, inlets, and estuaries suitable for anchorage limits the number of good harbours. In some cases, completely artificial harbours have had to be built. Takoradi, the chief port of Ghana, is such a man-made harbour. Usually sandy, the shores are separated from the mainland by shallow lagoons which are unsuitable for ports even when deepened. The shallow waters found on many African coasts make it necessary for ships to anchor well out to sea and send in small boats to cross the line of waves breaking on the sandy shores. The material making up the many bars and coastal sand formations is carried to the seas as sediment by the many large rivers of the continent.

Fig. 2

Since the plateau in most places fails to reach the ocean, coastal cliffs are rare, except in the extreme southwest and northwest where the crumpling of the earth's crust has created mountain ranges which border the ocean.

Figure 2. Loading Cocoa into Surf Boats at Accra.
The shallow waters along much of Africa's coastline prevent the close approach of freighters. The ships must remain anchored in deeper water and their cargoes are carried out to them by surf boats like those in the picture. To overcome this difficulty, artificial harbours are being built.



The continental shelf surrounding Africa is narrow, thus few good fishing grounds exist, and the fishing industry is relatively unimportant. Another effect of the narrow shelf is that most of the islands off Africa are the tops of volcanic piles rising thousands of feet from the main ocean floor. In some cases, the volcanic piles are increased in size by the addition of the hard skeletons of a sea animal known as coral. Islands formed of such material are, of course, called coral islands. The warmth of the waters washing tropical Africa allows these interesting sea animals to thrive in many areas.

WORK UNIT 6

The Language of Geography Add to your reference list definitions of the following terms: nationalism, colonial status, escarpments, mesas, coral islands.

Problems and Projects

1. Complete three outline maps of Africa to show the political status of the countries of Africa (a) in 1900, (b) in 1919, and (c) at the present.
2. Why were other continents explored and settled by Europeans before Africa?
3. Give several reasons why Africa can be described as "one of the most retarded areas in the world".
4. Justify the statement: "Africa is a land of change".
5. What factors hindered inland exploration before 1900?
6. Why were European nations interested in establishing colonies in Africa?
7. Why is it a disadvantage for Africa to have a short coastline in comparison to its area?

Maps

1. Mark and label the principal mountain and plateau areas of Africa on an outline map of the continent.

CLIMATE, VEGETATION, AND SOILS

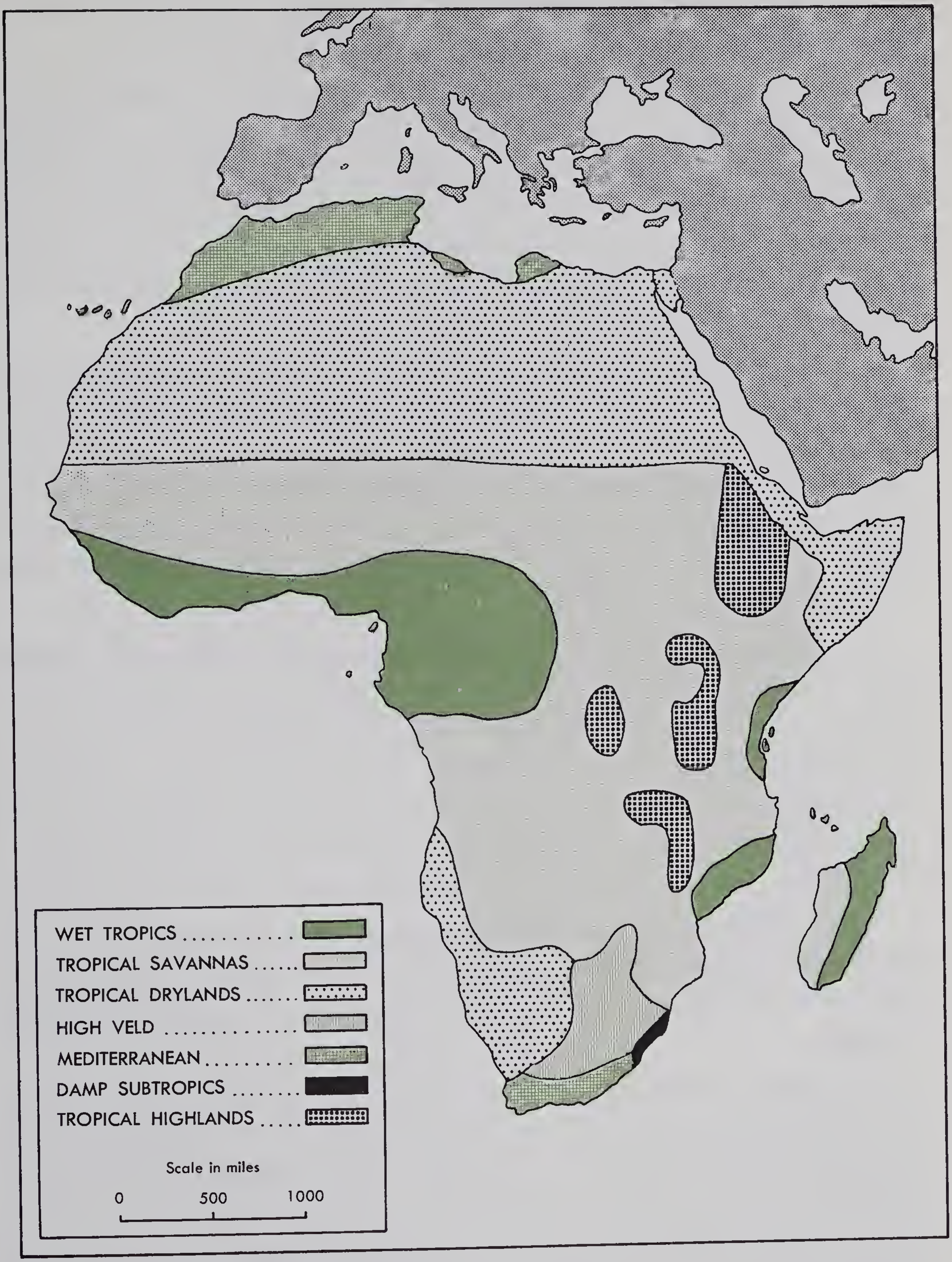
Considered as a whole, Africa has a hot climate because three-quarters of the continent lies in the Tropics between the Tropic of Cancer and the Tropic of Capricorn. However, there are cooler areas that lie (1) outside of the Tropics, (2) beside cold ocean currents, and (3) at high elevations.

Unlike those of the British Isles, where no region is distant from the sea, the temperatures of most of Africa are influenced little by the oceans. This is especially true in the north, where nearness to the vast Eurasian land mass and the great east-west width create a huge interior region far removed from oceanic effects.

Rainfall varies greatly in both amount and distribution from region to region in Africa. Generally speaking, rainfall gradually grows less as distance from the equator increases. The very wet equatorial zone is succeeded by the drier Savanna Zones in both the north and the south, which, within themselves, become more and more arid until semi-desert conditions (less than 16 inches of rain per year) result. In both directions, rainfall continues to diminish until true desert lands (less than 10 inches of rain per year) are reached. Precipitation gradually increases again in the extreme northwest and south.

Africa has all of the three principal types of vegetation areas—
Map 6 (1) forests, (2) grasslands, and (3) deserts. Although many people picture all of Africa south of the Sahara as a vast, unbroken tropical jungle, only eight per cent of Africa is covered by tropical rainforest, and the total forested area of all types represents only one-fifth of the continent. The rest of Africa is almost equally divided between desert vegetation and grasslands which may or may not have trees.

Unlike the soils of the British Isles and of southern Canada, which consist chiefly of transported material, the soils of Africa are largely derived from the ancient bedrock on which they lie. Since the particles making up the soil were not rounded off by movement and friction, they have angular surfaces. When heavy machinery is used on these soils, their particles become so closely packed together that they form a very hard surface which hampers plant growth. The hard, sharp qualities of the soil particles also quickly wear


WET TROPICS
TROPICAL SAVANNAS
TROPICAL DRYLANDS
HIGH VELD
MEDITERRANEAN
DAMP SUBTROPICS
TROPICAL HIGHLANDS
Scale in miles
0
500
1000

Map 2. Climatic Zones.

away disc plows, so that much of the work on African farms must be done by hand methods. In many areas the weathering of the ancient rocks of the African plateau yields soils which contain few of the minerals necessary for good crop production.

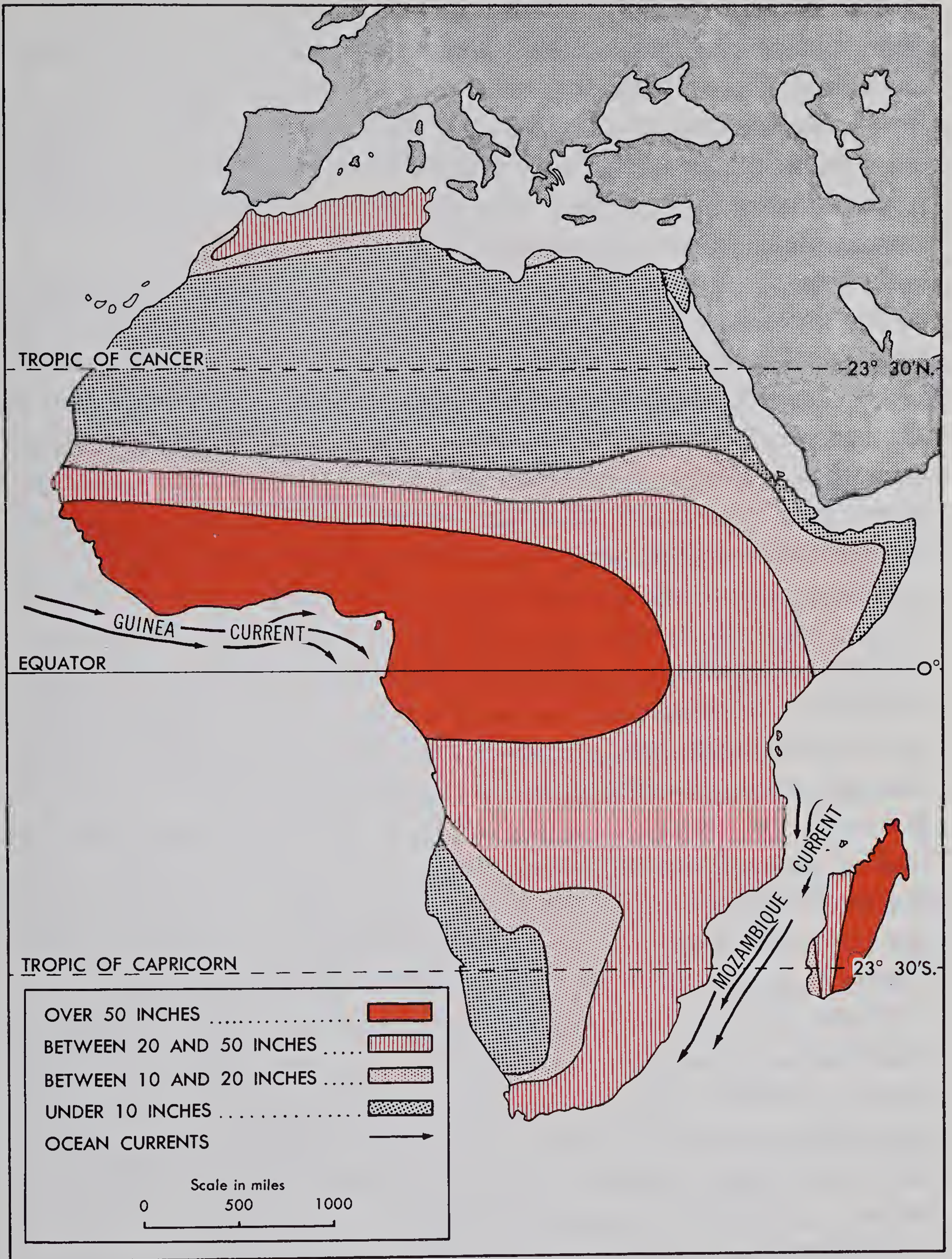
Poor farming methods and excessive grazing have caused serious loss of soil by erosion in many parts of the continent. Lacking proper training in agricultural practices, and having little money to spend on fertilizers, uneducated native farmers and herders are destroying large areas of productive soil in Africa. The combination of a reduced farming area and a rapid growth of population will make the problem progressively worse.

Climatic factors largely determine the type of vegetation that grows in any given area, and soils obtain their chief characteristics in response to temperature, rainfall, and vegetation. To illustrate the inter-relation among climate, plants, and soils we now discuss these three important geographical factors under the headings of seven main climatic regions of Africa as follows: (Read with constant reference to Maps 3 and 7).

1. **Wet Tropics:** The rays of the sun strike the earth most directly in the equatorial zone, making it a constantly hot region. Cooler, heavier air from both the north and south continuously flows into the zone as Trade Winds and forces the lighter, heated air upwards. Because the rising air cools as it moves upwards, it becomes unable to hold all the moisture that it is carrying. Heavy rain, which falls almost daily during the entire year, results from this cooling process.

The continuously hot, wet equatorial climate does not stretch across the whole continent because the high areas in tropical East Africa have a strong cooling effect that creates a Tropical Highland climate.

Although not located along the equator, part of the east coast of the African mainland and the entire east coast of Madagascar are included in this climatic zone. Much of the abundant rainfall received in these two areas is brought by the Southeast Trades which blow from the warm Indian Ocean. In addition to normal sources of moisture for a tropical area, the lands bordering the Gulf of Guinea


TROPIC OF CANCER
23° 30'N.
GUINEA CURRENT
EQUATOR
0°
MOZAMBIQUE CURRENT
TROPIC OF CAPRICORN
23° 30'S.
OVER 50 INCHES
BETWEEN 20 AND 50 INCHES
BETWEEN 10 AND 20 INCHES
UNDER 10 INCHES
OCEAN CURRENTS
Scale in miles
0
500
1000

Map 3. Annual Rainfall.

benefit from the effects of damp air masses that move in from over the warm Guinea ocean current.

Map 3 The average rainfall of the equatorial climate zone is 60 inches a year, but several areas within the region get much more rainfall than that. The Cameroon Peak, near the Gulf of Guinea, for example, is annually deluged by over 300 inches of rain, making it *Map 4-5* the rainiest place in Africa. Temperatures average 80° F., with the hottest days seldom rising above 90° F., and the nights, which are usually clear, rarely dropping below 70° F.

Vegetation and Soils — The dense *tropical rainforests* grow in the areas where the climate is continuously hot and wet. With such ideal growing conditions, the rainforests consist of a vast array of plants engaged in a life-and-death struggle for the rays of the sun. In their competition for sunlight, the broadleaf evergreen trees that dominate the rainforest attain heights of over 150 feet. These giants have few branches on their trunks but, at the top, burst forth into huge leafy crowns that interlock with neighbouring tree tops to form a continuous canopy over the forest floor. Twisted around their trunks and upper foliage are numerous ropelike vines, orchids, and parasitic plants that live off the sap of the trees. Many of the large trees support their high trunks by huge roots that spread out from the base of the tree like great buttresses. So effectively does the tree canopy cut off the rays of the sun that the floor of the forest is very dimly lighted. Lack of sunlight limits plant life to small trees and an undergrowth of low vegetation that can be penetrated without much difficulty. Only where the canopy of trees is broken, as at *Fig. 5* the edge of a river, and the sun is allowed to reach the floor of the forest, do *jungles* of thick, impenetrable undergrowth result.

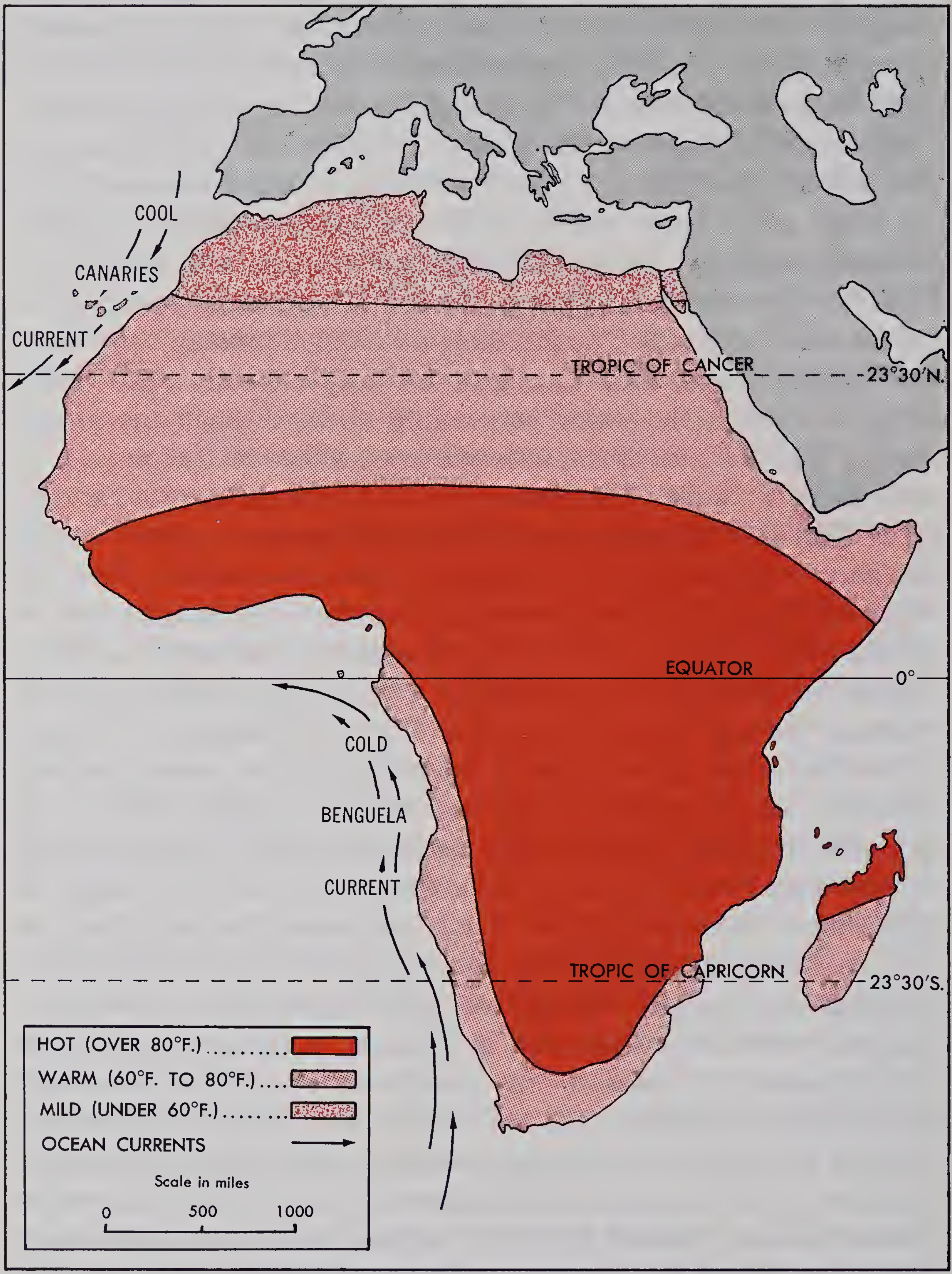
Unlike the temperate forests of Canada, the tropical rainforests have few pure stands of one species. Instead, one finds several species growing side by side—a condition that usually makes profitable lumbering operations impossible. Trees found in the tropical forests that have proven valuable to man are the oil palms, rubber, mahogany, ebony, teak, and many others.

The thickest of the tropical rainforests grow in the basin of the Congo River and the wetter sections of the Guinea coastlands.

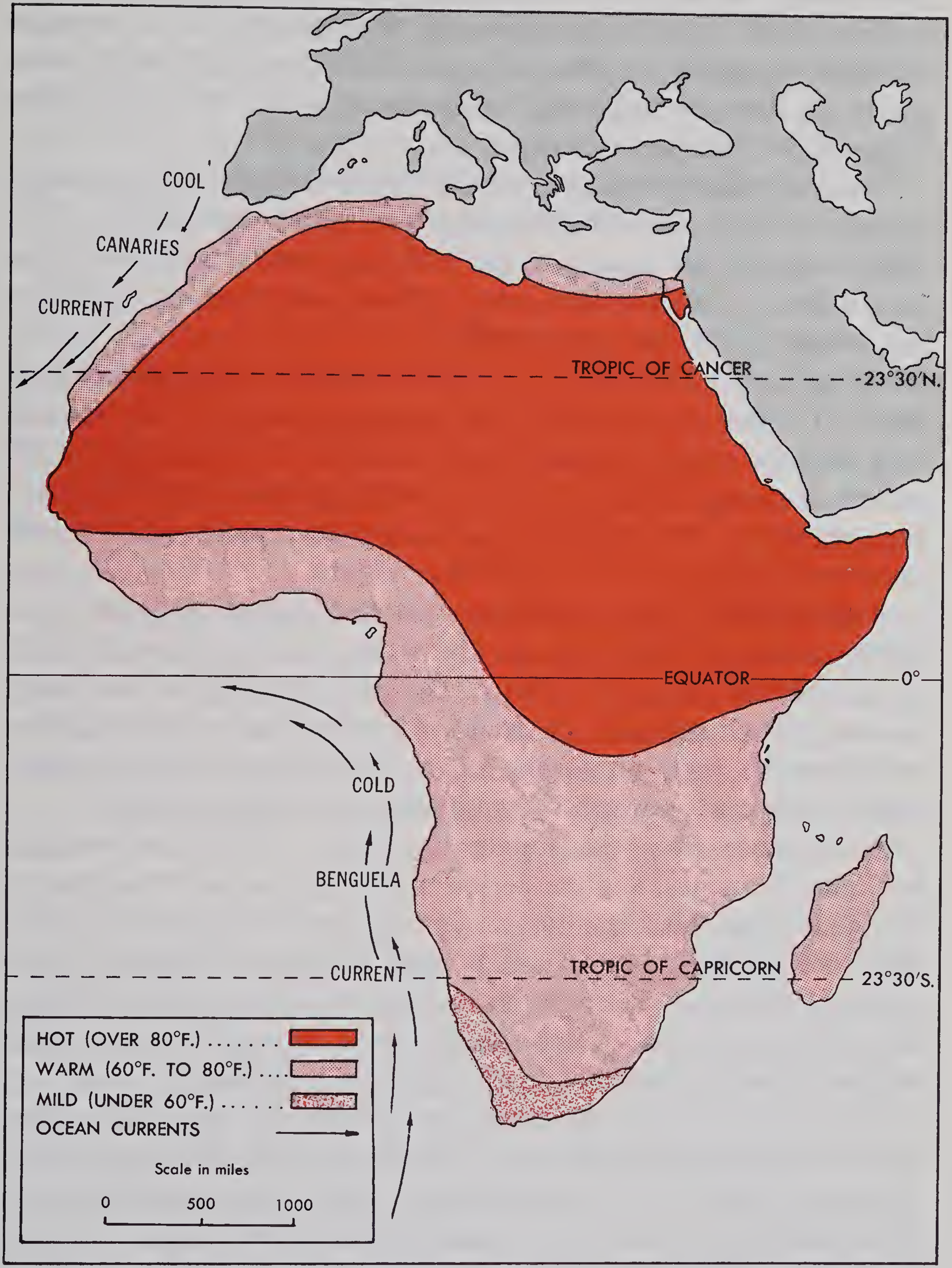
More open rainforests with smaller trees grow along the east coast of Madagascar.

Despite the fact that the red-yellow soils of the wet tropics support a thick, luxurious, natural vegetation, they are generally poor in fertility and become quickly exhausted when cleared and used for crop cultivation. The constantly hot, wet conditions contribute to the inferiority of the soils in the following ways. Firstly, the damp heat speeds up the chemical breakdown and bacterial decay of plant and animal matter, making tropical soils low in humus content. Secondly, the plentiful rainfall, soaking into the ground, dissolves the soluble minerals in the soil and carries them down out of the reach of plants. The insoluble iron and aluminum compounds left behind are reddish and give the tropical soils their typical colour. Thirdly, the water percolating down through the ground carries tiny particles of soil to levels beyond the reach of plant roots and leaves a coarse upper layer with a poor structure for farming.

2. **Wet-Dry Tropics (or Tropical Savannas):** The Tropical Savannas surround the Wet Tropics on all sides except where the equatorial zone reaches the coast. Like the Wet Tropics, the savanna zone is always warm, but, unlike the tropical zone, rainfall is chiefly concentrated in the summer season rather than being distributed throughout the year. The seasonal changes in the sun's north and south position cause the change in the rainfall pattern. In June, the direct rays of the sun strike the earth north of the equator, bringing rain to a belt between 5 and 10 degrees North. At the same time, the equivalent latitudes in the south are under the influence of the drying Trade Winds and so receive very little rainfall. In December, the situation is reversed, so that the belt south of the equatorial zone is receiving rainfall because of the overhead sun, and the northern savanna belt is parching in the dry wind region. The apparent movement of the sun thus causes two belts—one to the north and another to the south of the Wet Tropics—that receive rainfall during their hot summer season and dry, trade-wind weather (similar to that experienced in desert regions) during their cooler, winter season. Similar Wet-Dry Tropics areas are located north and south of the Wet Tropics in South America.


COOL
CANARIES
CURRENT
TROPIC OF CANCER
-23°30′N.
EQUATOR
0°
COLD
BENGUELA
CURRENT
TROPIC OF CAPRICORN
23°30′S.
HOT (OVER 80°F.)
WARM (60°F. TO 80°F.)
MILD (UNDER 60°F.)
OCEAN CURRENTS
Scale in miles
0
500
1000

Map 4. Average Temperatures – January.


COOL
CANARIES
CURRENT
TROPIC OF CANCER
-23°30'N.
EQUATOR
0°
COLD
BENGUELA
CURRENT
TROPIC OF CAPRICORN
23°30'S.
HOT (OVER 80°F.) .... 🟥
WARM (60°F. TO 80°F.) .... ▨
MILD (UNDER 60°F.) ...... ▨
OCEAN CURRENTS →
Scale in miles
0
500
1000

Map 5. Average Temperatures – July.

Because there are few high, continuous mountain ranges in Africa, climatic changes are very gradual from place to place. This fact is well illustrated in the Savannas or Wet-Dry Tropics, where the portion of the zone that merges with the equatorial zone averages *Map 3* 60 inches of rainfall a year, while, on the opposite side of the zone, where the Savanna merges with semi-desert lands, the rainfall drops to less than 20 inches annually.

The most unfortunate characteristic of the rainfall in the savanna region, as is the case in most of Africa, is its unreliability. It is quite common for an area to get sufficient rain for good crop production one year and then suffer famine conditions the following year when the rainfall is cut in half.

Vegetation and Soils — Tropical grasslands, called *savannas,* occupy the Wet-Dry Tropics. The winter dry season of this climatic zone largely limits tree growth to varieties that can survive the period of drought. The wet, hot summers provide excellent growing conditions for tropical grasses, which replace trees as the dominant vegetation in the Wet-Dry Tropics.

Although the edge of the savanna that merges into the rainforest undergoes a three-month dry season, it still receives 30 to 60 inches of rain during the rest of the year. During the hot, rainy season great clumps of grass from five to twelve feet tall grow almost as high as the small trees of the region. These coarse tropical grasses wither, toughen, and turn brown during the winter drought.

As distance from the equator increases, rainfall decreases to less than 30 inches, and the period of drought ranges from three to six months. In this belt the grass grows only five feet tall and the trees are usually thorny and drought resistant. *Parklands* is the name often used to refer to this part of the savanna lands because the flat-topped trees that rise singly or in clumps above the thick tropical grass give the landscape a park-like appearance.

Where the savannas gradually merge into the semi-arid regions that border the deserts, less than 20 inches of rain falls, and the dry season lasts from five to eight months. Under such conditions only short, desert-type grasses that grow in clumps and small, scattered thorn trees and bushes survive. Fortunately, the short grass of these *tropical thornbush* areas is valuable for stock raising.

The two most common trees of the drier sections of the savanna are the baobab and the acacia trees — both of which are well adapted to survive prolonged periods of dry weather. The baobab is a strange-looking tree, with a huge trunk that can grow as much as thirty feet thick! Its most important characteristics are extra-long roots that enable it to draw upon deep underground moisture, and special tissues with the ability to store water for dry periods.

The soils of the wetter edge of the Wet-Dry Tropics (Savannas) are similar to those of the Wet Tropics zone which they border. However, as distance from the equator increases and rainfall diminishes, the soils improve in quality. The smaller yearly rainfall and marked dry season reduce the loss of humus and soluble minerals and prevent the development of the very coarse type of soils found in the wet tropics. The grass which ordinarily covers the drier portions of the savannas provides an excellent source of organic matter. Usually quite fertile, these soils are widely used for growing grains and cotton.

3. **Tropical Drylands (or Semi-Desert and Desert Climates):** One-third of Africa consists of desert regions that receive less than 10 inches of rain annually, and another considerable fraction of the continent is short of rainfall during all, or at least one, of the seasons. The amount of rain received in the deserts is even more variable than that of the Wet-Dry Tropics because the short, violent showers that make up the only rainfall of the desert arrive at very irregular intervals. *Map 3*

North Africa consists largely of the Sahara. Stretching over 4,000 miles from the Red Sea to the Atlantic Ocean, this enormous dryland is the largest desert region in the world. Much smaller in size, the Kalahari Desert of the Southwest is neither as dry nor as hot as the great northern desert. Except for the very dry, barren coastal region known as the Namib Desert, the Kalahari is really a semi-desert and not a true desert. Average summer temperatures rise to the 90's on the Sahara but only reach the 60's on the Kalahari. A record-breaking temperature reading of 136° F. in the shade has been reported from the Libyan section of the Sahara. Because there *Map 4-5* is little vegetative cover on the ground, the ground surface will often heat up to over 170° F. during the generally cloudless daytime, and then quickly cool off at night. A daily range of temperature of 50° F. or more is common, and, since winter temperatures are over 20 degrees cooler than those in summer, frost is common during winter nights. The drier areas north and south of the equatorial regions become hotter in summer than the tropics because, unlike that region, they have no heavy cloud cover to block out the rays of the sun. It is the cooling effect of the cold Benguela ocean current, which flows past the Kalahari, that helps to make its summers cooler than those of the Sahara.

Vegetation and Soils — Lying directly between the drier edge of the grassy savanna and the deserts, is a region usually referred to as *steppe lands.* An average rainfall of only 15 inches is reduced in effectiveness by high evaporation due to warm temperatures, so that the only vegetation that can thrive is thorn bushes, *Fig. 3* especially the acacia, and clumps of desert grass. Although unable to support a large stock population, these grasslands serve as good grazing land, especially on the drier edge of the South African Veld.

Vegetation gets progressively poorer as the drylands become more and more arid, until well-scattered shrubs form the only vegetation. Areas of barren rock and sand with no vegetation are surprisingly scarce considering the vast percentage of Africa that can be classed as drylands. Less than eight per cent of the continent is true desert with no permanent vegetation.

Figure 3. Semi-desert land in Bechuanaland.
This is part of the Kalahari Desert which is not a true desert but a semi-desert with some vegetation. The small and unreliable rainfall is sufficient for the growth of coarse grass and scattered, stunted trees.

In places where water is available at or near the surface, oases are formed. Of the trees that form a thicket around such favoured spots, the date palm is the most valuable.

The soils of the steppe lands which lie on the wetter edges of the Sahara and Kalahari deserts contain less humus than savanna soils that have a richer grass cover, but they are still quite fertile.

The low rainfall of the desert regions reduces the loss of soluble minerals to a minimum, making desert soils rich in many of the most important plant nutrients. However, they are low in humus because plant life is so scarce. Irrigation and the addition of organic matter and fertilizer make desert soils quite productive unless, as is often the case, the high evaporation rate of the desert has caused an excessive accumulation of mineral salts at the surface.

4. **High Veld:** Although located on the dry western side of the Drakensberg Mountains, the high elevation of the Veld brings it more rainfall (usually about 30 inches a year) and cooler temperatures than are received on the Kalahari desert farther down the gentle leeward slope of the South African tablelands. Some frost and snow occur because of the altitude, but middle latitude location and the moderating influence of the nearby oceans prevent the development of the frigid conditions common on the Canadian prairies, which in many other ways resemble the High Veld region.

Map 3

Map 4-5

Vegetation and Soils — The High Veld is a treeless grassland with prairie-type grasses that grow to three feet in height. On the accompanying vegetation map the High Veld is shown as *temperate grasslands.* An area of similar vegetation is found along the northern edge of the Sahara. Since this northern temperate grassland receives only half as much rainfall as the High Veld, it has a much poorer grass cover.

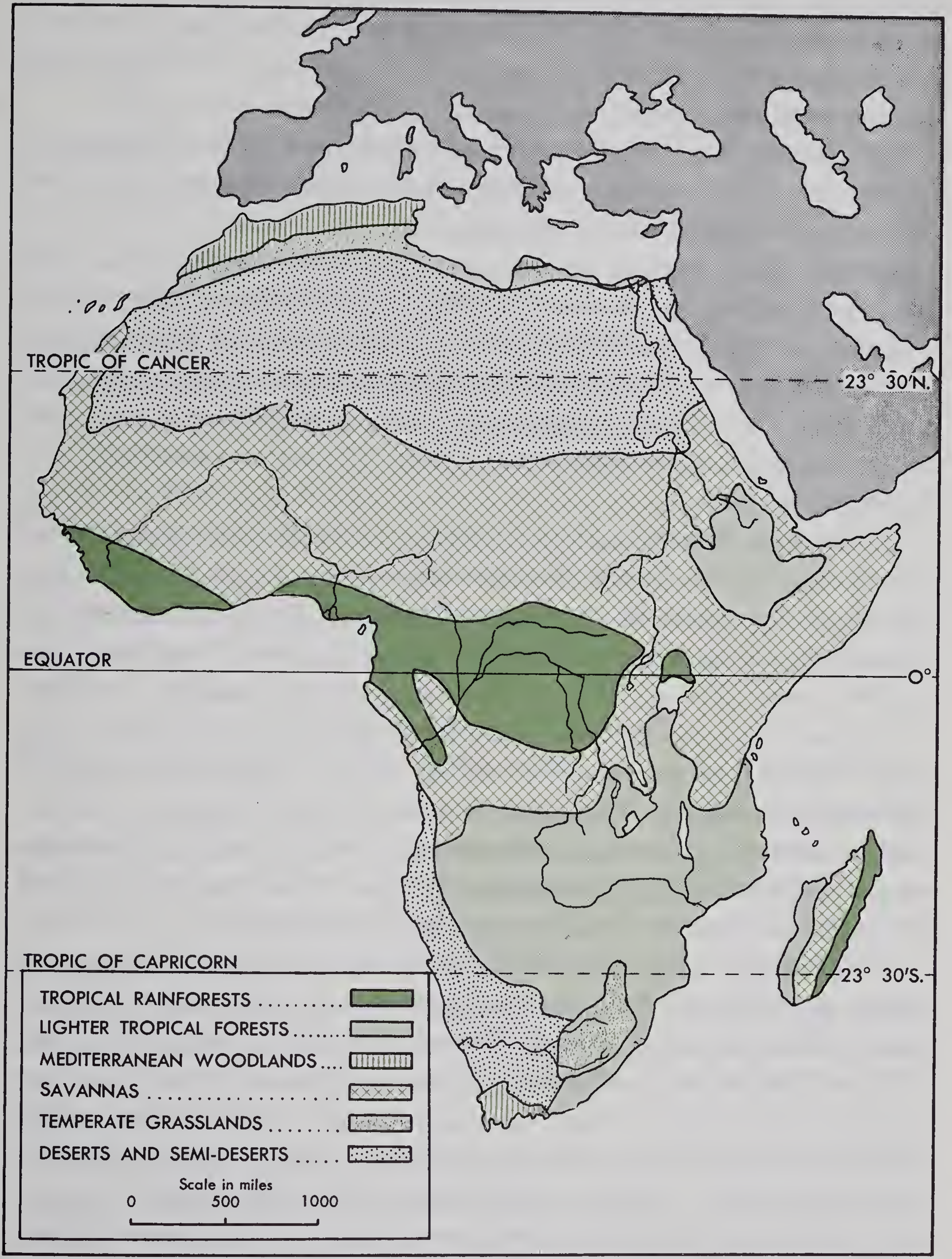
The combination of moderate rainfall (30 to 40 inches) and natural grass cover have developed excellent soils in the High Veld region of the Union of South Africa. Here is located one of the best agricultural regions on the continent.

5. **Mediterranean Zones:** The name *Mediterranean* is applied to this climatic zone because it has a climate common to most of the lands surrounding the Mediterranean Sea. From April to September

(i.e. The Northern Summer) the northward shift of the overhead sun brings hot, dry summers to the western half of the north coast. During the same period, the northward shift of the sun also places the Capetown district, in the extreme Southwest, under the influence of air masses from the west which bring it rainy winters. When the overhead sun moves to the Southern Hemisphere during the other half of the year, the situation is reversed, with the Cape Region having dry summer weather, while the air masses from the west bring the Northwest coast the same type of cyclonic rainfall that we receive in Canada.

The cool Benguela Current keeps summer temperatures in the *Map 4-5* Southwest cooler than those recorded in the Northwest, where the Canaries Current is a less effective cooling agent. About 25 inches *Map 3* of rain fall in the Capetown district in a year, and between 16 and 30 inches fall in the northern Mediterranean zone—the amount depending upon altitude. The mountains in both of the Mediterranean zones of Africa create local areas of higher rainfall and cooler temperatures which often result in winter snow and frost. However, the typical pattern of climate in these regions is one of dry, hot summers and mild, wet winters.

Vegetation and Soils — The shortage of moisture during the hot, dry summers of the Mediterranean climatic zones has led to the development of a distinctive type of woodland in the southern tip of Africa and along the western half of the north coast. Known as *Mediterranean woodlands*, these areas feature plants that can survive the long summer droughts. The most common landscape on the lowlands of Northwest Africa consists of small evergreen shrubs and brush thickets, sometimes dotted with small, well-scattered broadleaf evergreen trees. Where woodlands grow at low elevations, they usually consist of broadleaf evergreens, such as the olive, fig, holly, oak, and cork oak. These and other trees that grow in the area have several features which enable them to withstand the effects of the dry, hot summers of the region. The cork oak, with its thick bark to reduce moisture loss through evaporation, is typical of the drought-resistant trees that grow in the Mediterranean region. Other species have leaves with hard, shiny, or leathery surfaces that reduce


TROPIC OF CANCER
23° 30′N.
EQUATOR
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TROPIC OF CAPRICORN
23° 30′S.
TROPICAL RAINFORESTS
LIGHTER TROPICAL FORESTS
MEDITERRANEAN WOODLANDS
SAVANNAS
TEMPERATE GRASSLANDS
DESERTS AND SEMI-DESERTS
Scale in miles
0
500
1000

Map 6. Vegetation.

the loss of water by transpiration. The leaves may also be small, thick, and stiff or in the form of thorns, which protect them from grazing animals. Excessive grazing by sheep and goats has destroyed all the vegetation on many slopes in Northwest Africa. Coniferous trees, especially pine and cedar, grow on the higher and damper mountain slopes.

Trees of the Mediterranean zone in South Africa are different in species from those of the northern Mediterranean zone but have the same drought-resistant qualities.

Soils of these regions are thin and poorly developed. Since the hot season is the driest period, the chemical processes that form good soils are slowed down. However, the lowland areas of these regions in both North and South Africa benefit from loose materials washed down from the mountain slopes and, consequently, have soils that can be used productively for agriculture if they are fertilized and managed properly.

6. **Tropical Highlands:** We noted, in our discussion of landforms, that in east-central Africa there are large areas of high plateaus and mountains in parts of Ethiopia, Uganda, Kenya, Tanganyika, Nyasaland, and a portion of the Rhodesias. Because these areas are located near the equator, their temperatures remain uniform *Map 4-5* throughout the year, but their elevation above sea level gives them temperatures that are from 10° F. to 30° F. cooler than those of *Map 3* the nearby lowlands. Rainfall is heaviest at high elevations, especially on those slopes exposed to the water-bearing monsoon or trade winds which blow from the Indian Ocean. Much less rain falls on the sheltered leeward slopes and at lower elevations.

Vegetation and Soils — Most of the tropical highlands of Africa are occupied by *lighter tropical forests.* The cooler temperatures and more varied rainfall of the highlands reduce the lushness of these forests in comparison to the rainforests. The trees are smaller, more widely spaced, and more often of the deciduous type which lose their leaves during dry seasons. A thick undergrowth of shrubs and grass comprise the ground cover of the lighter tropical forests. In the driest parts of these woodlands, the characteristic type of vegetation is low stunted trees and thorny plants.

Where slopes are not too steep, the fertile volcanic materials, which cover much of the plateau land of East Africa and Ethiopia, have led to the development of many areas of fertile soils. Elsewhere in the highlands, the surface and climate are so varied that a great variety of soils are found.

7. **The Damp Subtropics:** Along the east coast of South Africa, roughly covering Natal Province in the Republic of South Africa, the most constant winds are the Southeast Trades. Having crossed the warm Indian Ocean before reaching land, these winds carry considerable amounts of moisture, which they drop as rainfall on the coastlands of Natal. The greater part of the 40 inches of rain that falls during the year is concentrated in the summer months from October to March (note the reversal of seasons in the Southern Hemisphere). Winters are mild and summers, hot. *Map 3*

Vegetation and Soils — Occupying the damper coastal regions of Natal are *lighter tropical forests,* but the inland areas that suffer most from the comparative dryness of the winter season support only grass and drought-resistant trees and shrubs.

Formed under both grasslands and forests, with plentiful but not overabundant rainfall, the soils of the extreme Southeast are generally deep and fertile.

THE ANIMALS OF AFRICA

Rich in food, the lush tropical rainforests of Africa teem with animal life. Hippopotami and crocodiles abound in the streams and rivers. Many species of wild cats, monkeys, gorillas, chimpanzees, and other climbing animals, together with a vast array of birds live among the great trees. So many different species of birds can be found in the rainforests that they have not all been classified. Frogs, toads, and other amphibians, as well as snakes, lizards, turtles, and many other reptiles are plentiful. The snakes include deadly cobras, vipers, and pythons.

The rich grasses and tree foliage of the savanna lands of Africa once fed a large population of antelopes, giraffes, zebras, and other hoofed animals. Preying on them were such flesh-eaters as the lion, leopard, and cheeta, whose leftovers were devoured by the scaveng-

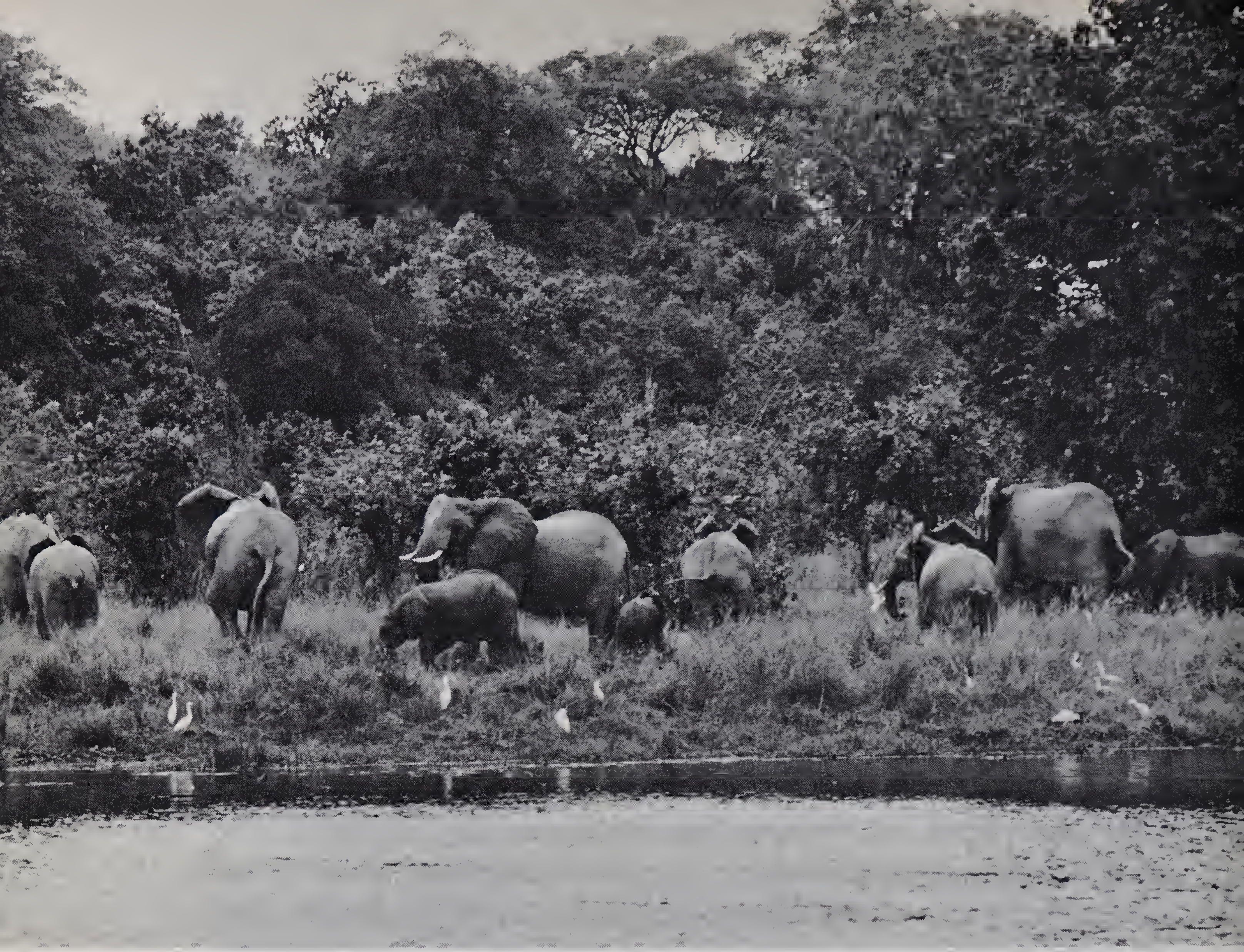


Figure 4. A Herd of Elephants in Uganda.
This picture was taken in one of East Africa's huge game reserves where the animals are protected. The vegetation is typical of the wooded savannas and would be more open away from the river.

Fig. 4 ing hyenas and jackals. The elephants, rhinoceros, and other plant-eating animals ranged from the more open parts of the rainforest well into the rich savanna grasslands. Increased human population and the introduction of firearms and modern farming methods in the grasslands have reduced the numbers of these large mammals to the point where they are common only on game preserves. However, monkeys still abound in the tree clumps and reptiles and insects are plentiful.

The animal most often associated with the desert, the camel, is common in the Sahara, having been brought to Africa before the birth of Christ. Some native inhabitants of the more hospitable parts of the drylands are lions, antelopes, and desert foxes.

RIVERS AND LAKES

Power plants could be built at spots where the many large rivers of Africa drop from one level to another on the great plateau lands or tumble over the edge of the tablelands to the coastal plains. Most of these promising power sites are still undeveloped, but they may some day play a vital role in the development of modern industry in Africa. Some of the rivers, especially the Nile, offer water for irrigation to the parched lands which they cross. Navigation is largely limited to the sections of the rivers that cross level plateaus; the Nile and Niger are the only major rivers whose first waterfalls are far enough inland to allow navigation by moderate-sized boats for any considerable distance from the sea.

Nile—Flowing 4,160 miles before entering the Mediterranean Sea, the Nile is the world's longest river. It drains over one million square miles, but its volume of flow is greatly reduced by evaporation and by the lack of tributaries in its lower and middle courses where it must cross the desert. Crafts of "moderate size" can travel upstream to the Aswan Dam at the *First Cataract* (rapids) and, during flood-season, to the *Second Cataract,* over 1000 miles from the mouth of the river. Zones of highly resistant rock which cross the course of the river give rise to six sections of rapids between Aswan in Egypt and Khartoum in the Sudan.

Lake Victoria serves as the source of the main stream of the river when it spills over Owen Falls to begin the *White Nile.* Here, the flow is relatively steady because the lake is fed by year-round tropical rainfall. The *Albert Nile,* flowing from Lake Albert, is the first tributary to join the Nile; then the *Blue Nile* and *Atbara* contribute water from the Abyssinian Highlands. These streams cause the yearly flooding of the lower Nile since their sources in the Abyssinian Highlands receive heavy monsoon rain during the summer season. The muddy waters of the Blue Nile and Atbara also supply most of the silt which the Nile deposits at its mouth to form a large *delta.* The annual flood waters also deposit fresh layers of silt on the lands bordering the river, renewing their fertility. However, the supplying of water for irrigation on the dry areas that it crosses in its middle and lower courses is its principal value.

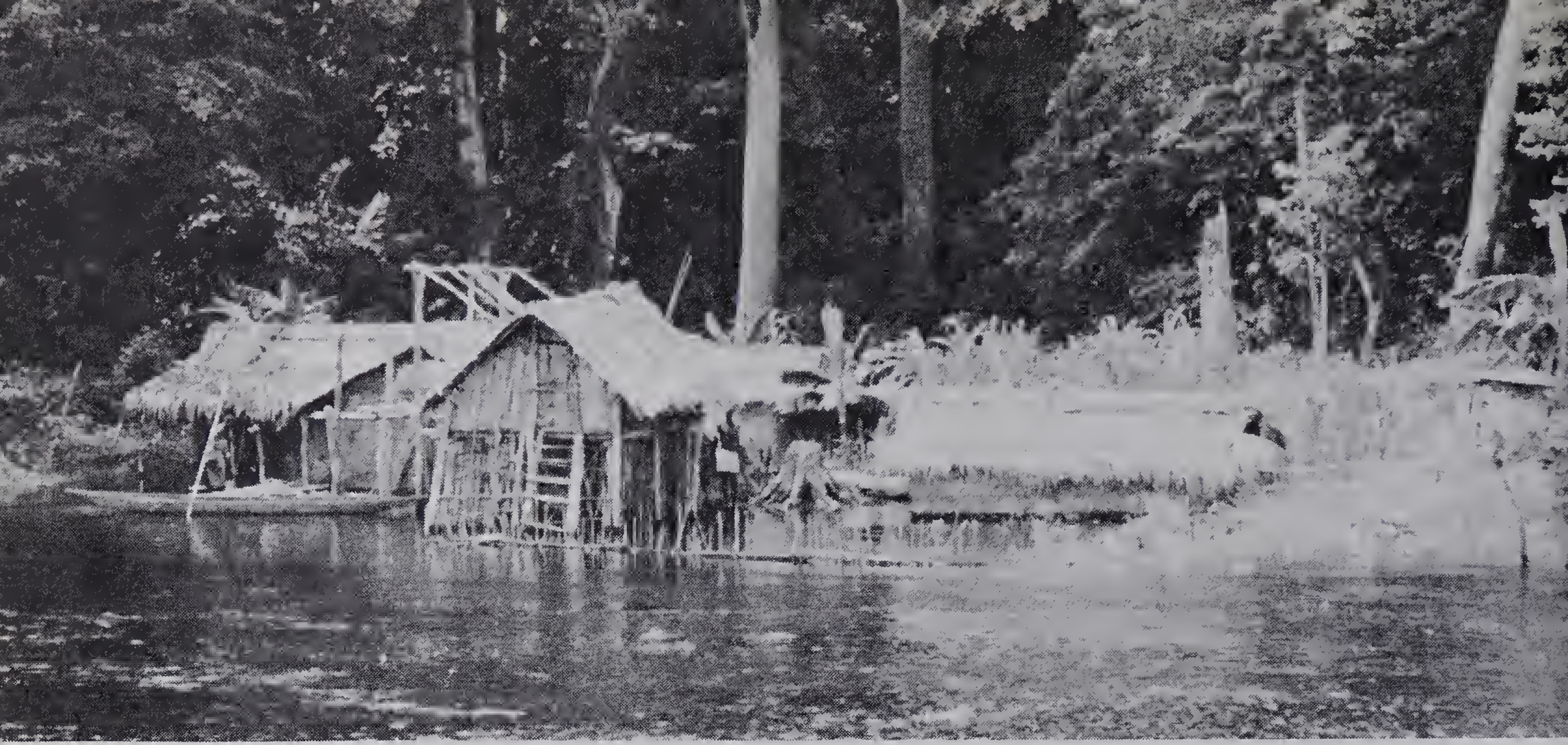


Figure 5. Native Homes in the Congo Rainforest.
Because of the dense tropical rainforest vegetation, most of the native habitation in this region borders the river courses. As in this picture, the crude buildings are often built out over the water. The small cornfield behind the buildings would supply part of the inhabitants' food; fishing and hunting supply the rest.

Congo — Although shorter than the Nile, the Congo has a much greater volume, emptying more water into the oceans than all of the other rivers of the continent combined. Its 2,700-mile length exceeds that of Canada's longest river, the Mackenzie-Peace, by 65 miles. Only the mighty Amazon of South America has a larger drainage area than the Congo River, which drains almost 1½ million square miles. The Congo's huge volume of flow is due to its location in the very wet region around the equator. The heavy, year-round rainfall of this equatorial region maintains the flow throughout all seasons. Ocean steamers can travel upstream for almost 100 miles before falls and rapids halt their passage. Beyond this long stretch of rough water, which is by-passed by a railway 200 miles long, the stream can be navigated by river steamers another 1000 miles upstream to Stanley Falls. Navigation is again possible above the Falls and also on many of the major tributaries of the river. Stretching 85 miles inland, the deep, protected estuary of the Congo provides sites for a few ports.

Fig. 7
Map 11
Niger—Rising in the rain-drenched Fouta-Djalon Highlands less than 200 miles from the ocean, the Niger follows a very round-

about route for 2,600 miles and drains more than ½ million square miles (as much as our mighty St. Lawrence) but it finally empties into the Gulf of Guinea. A series of rapids 400 miles from the coast prevents further inland travel by large vessels, but canoes can travel the waters on the plateau surface above the rapids for several hundred miles more. During its northward wanderings, it passes through dry lands of the South Sahara, where it is valuable as a source of water for irrigation.

Zambezi — The Zambezi (1,600 miles long—the same as Canada's Nelson River System) drains over ½ million square miles of South Central Africa. A delta has formed where the river discharges into the Mozambique Channel. Since much of its watershed receives heavy rainfall during only one season, the river flows much more strongly in the wet season than in the dry season. Where the waters plunge 343 feet into a narrow gorge at the world-famous Victoria Falls, they provide a huge, undeveloped source of power. The height of Victoria Falls is more than twice that of Niagara Falls, but Niagara has a much greater flow of water. Some 300 miles downstream from Victoria Falls, the power of the Zambezi has been harnessed by the construction of the Kariba Dam, which now holds back the waters of the largest man-made lake in the world. Navigation by native boats is possible on much of the upper plateau course of the Zambezi and on several long stretches of the middle lowland course, but impassable rapids make the lower course unnavigable by ocean ships. *Map 15*

Orange — The Orange River (1,300 miles long or 100 miles longer than the Saskatchewan River of Western Canada) drains most of the South African plateau westward into the Atlantic. Its main tributary, the *Vaal*, adds the waters of the wetter northeastern sections of the basin. Because rainfall is light in most other parts of the system, and since the lower course of the main stream lies across the very dry Namib desert region, many of the tributaries and parts of the main stream are often dry. This unreliability of flow makes the Orange useless for navigation and of limited value for irrigation. *Map 15*

Limpopo — The Limpopo River of southeast Africa rates as a major stream but is of secondary importance because it is useless *Map 15* for navigation, and its waters are not needed for irrigation in the well-watered lands that it drains.

Map 13 **Lakes** Several of the world's largest lakes are located in Africa. The long rift valleys of East Central Africa provide storage basins for such large bodies of water as Lakes *Rudolf, Albert, Edward, Tanganyika,* and *Nyasa.* Some of these rift lakes are very deep: Lake Tanganyika, with a depth of 4,700 feet, is one of the deepest lakes in the world. Lake Nyasa is also very deep, plunging to depths of over 2,300 feet. Contrasting strongly with the other large lakes of East Africa is *Lake Victoria.* Unlike the rift lakes, Lake Victoria lies in a broad, shallow depression. Best-known as a major source of the Nile, this huge body of fresh water covers an area of 26,640 square miles, making it the world's third largest lake. Lake Victoria is slightly larger than Lake Huron (23,000 square miles), but much smaller than Lake Superior (31,820 square miles). *Lake Tana,* which is located in the Abyssinian Highlands at an elevation of 5,770 feet, is another important source of the Nile River.

Africa has several salt lakes that lie in basins of *inland drainage.* Such basins result when a rim of land surrounds an area of lower land, leaving no outlet to the sea. If any rivers flow into these basins, they must, of course, empty into the lake, or lakes, at the centre of the drainage area. Since they are usually located in warm, dry areas, the lakes that occupy these basins lose much of their water by evaporation. The salts carried into the lakes by the rivers are not lost through the evaporation process, and so the lakes gradually increase their salt content. Roughly one-third of Africa consists of areas of inland drainage; the most important basins surround (1) *Lake Chad* in the southeastern Sahara, (2) *Lake Ngami* in the Kalahari Desert, and (3) *Lake Rudolf* in East Africa.

WORK UNIT 7

The Language of Geography Add to your reference list definitions of the following terms: Tropics, Mediterranean Climate, Subtropics, Tropical Savannas, Parklands, steppe lands, oases, semi-deserts, rift lakes, inland drainage, delta, and cataract.

Problems and Projects

1. Refer to a vegetation map of the world to discover what areas outside of Africa are covered by (a) tropical rainforests, (b) savannas, and (c) hot deserts.
2. What areas in North and South America have climates similar to the different climatic zones of Africa?
3. What parts of Africa receive the same amount of rainfall as your community? How does the pattern of rainfall compare?
4. Do outside reading to obtain additional information about the problems of farming in areas of tropical soils.
5. Compare the value of the Nile River to the people of Egypt with the value of the St. Lawrence River to Canadians.
6. Of what value is Lake Victoria to the people of East Africa?
7. Why do areas around the equator have a hot, wet climate?
8. Why do savanna lands have few trees although the *annual* rainfall is heavy in much of the region?
9. Compare the soils of (a) the rainforest, (b) the savanna, (c) the desert, (d) the Mediterranean Zones, and (e) the High Veld, by using a chart with two columns headed "Good Characteristics" and "Bad Characteristics".

Maps

1. On maps of Africa
    (a) outline and shade the areas of
        (i) heavy rainfall
        (ii) moderate rainfall
        (iii) scanty rainfall
    (b) outline and label the areas of
        (i) forest
        (ii) grasslands
        (iii) deserts
    (c) mark the principal rivers, lakes, and coastal waters.

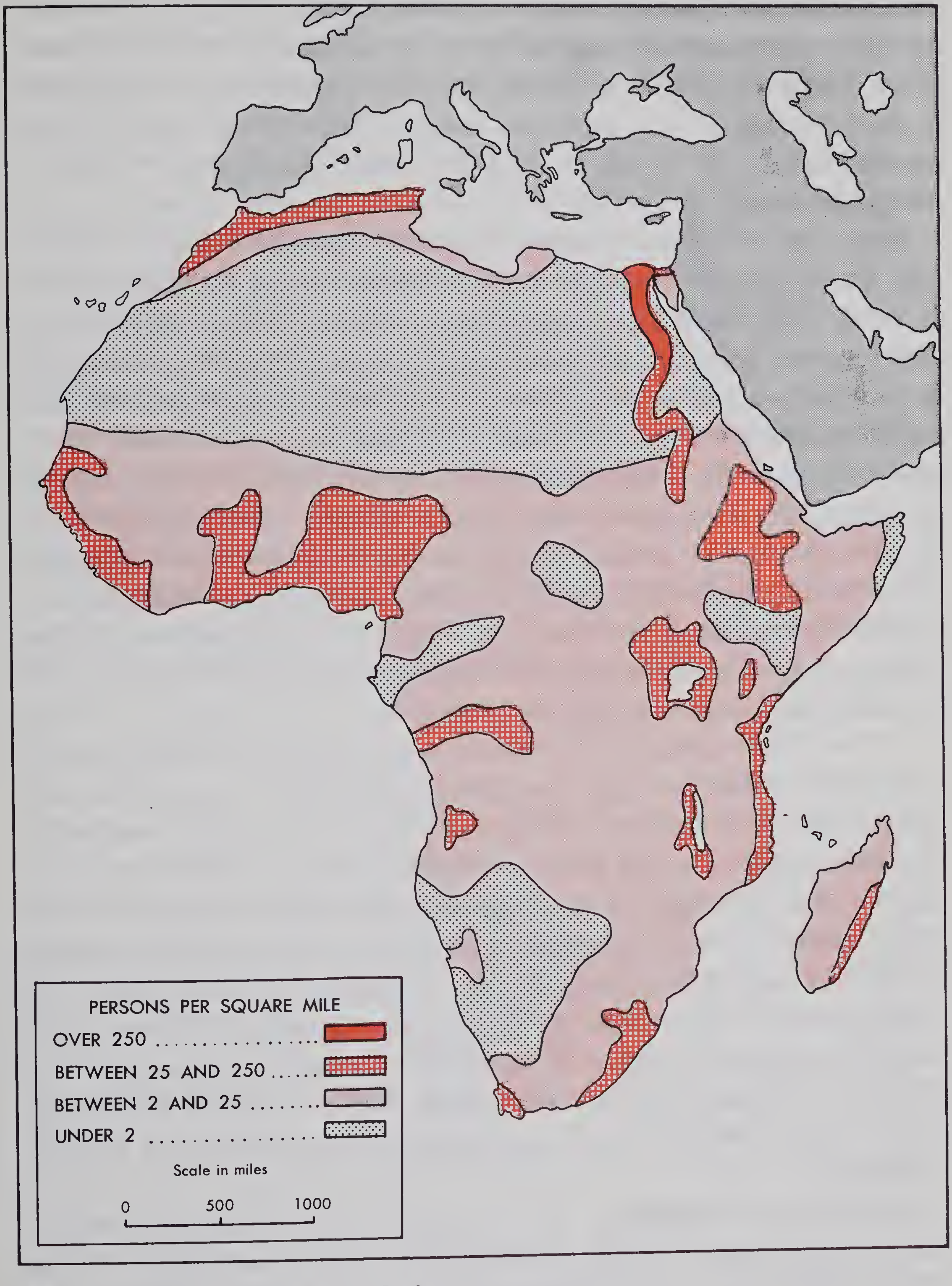
THE PEOPLE OF AFRICA

The countries of Africa seldom take an accurate census of their populations because government funds are desperately needed to combat the poverty, disease, and illiteracy that are so widespread on the continent. Official estimates, however, suggest that Africa has about 240 million inhabitants, which is slightly less than the number of people in North America.

Map 7 The density of population in Africa is only about 20 persons per square mile, compared with a world density of 50. It is because much of Africa consists of large areas of desert and jungle that this comparatively light population density prevails. The situation could change if parts of Africa became centres of manufacturing and trading like the British Isles. At present, the most densely populated sections are (1) the Nile Valley, with more than 1,200 persons per square mile, (2) sections of the high plateau and coastal plain of East Africa, (3) the coastlands and mining centres of South Africa, (4) the Mediterranean Lands of the Northwest, and (5) parts of the Guinea coast. Under present conditions, Africa is probably supporting a maximum population.

Groups of Peoples The major physical type in Africa is the Negro. African Negroes have dark eyes and skins, dark, woolly hair, and broad, flat noses, but they vary considerably in height and other characteristics. They are found in all parts of Africa south of *Fig. 16* the Sahara Desert. North of the Sahara, in the lands bordering the Mediterranean, most people belong to the Caucasian group. This group has brown hair and eyes, their hair ranges from wavy to straight, and the colour of their skins varies from light olive to dark brown. They have fairly thin lips and high-bridged noses. More than five million persons of European origin or descent live in Africa, about half in the Republic of South Africa, and about two million in northern Africa.

The Negro People of Africa — There are two main groups of Negroes — the Sudanese and the Bantu. The former are true negroes with black skins, dark woolly hair, broad flat noses, long heads, thick lips, and protruding jaws. They occupy a broad belt south of the Sahara from the Atlantic Ocean to the Red Sea.


PERSONS PER SQUARE MILE
OVER 250
BETWEEN 25 AND 250
BETWEEN 2 AND 25
UNDER 2
Scale in miles
0
500
1000

Map 7. Density of Population.

The Bantu live south of the great Sudan grasslands. Their skin is lighter in colour, and their noses less broad and flat. The northern Bantu are mostly farmers who raise yams, beans, millet, and bananas on their small farms or who work on cocoa and other plantations. Once easily classified as either hunter-herdsmen or as primitive farmers, many of the Bantu in South Africa have now left the ancient tribal way of life to work for white employers on modern farms, in mines, or in factories.

There are still a few groups of primitive peoples living in Africa. Best known are the Bushmen and Hottentots of the Kalahari region and the Pygmies of the Congo Basin. All of these groups are insignificant in numbers and economic importance but are interesting in their adjustment to very inhospitable lands. The uncivilized and backward Bushmen hunt animals with poisoned arrows and collect edible roots, seeds, fruits, snakes, and insects for food. Their homes are little more than crude wind-breaks. Slightly more advanced are the Hottentots, who make a meagre living from herds of cattle and sheep which supply milk and hides. The Pygmies, like the Bushmen, are usually less than five feet tall. These little people exist in the jungles of the Congo region by hunting with poisoned arrows and by collecting the edible part of plants.

The White Settlers in Africa — Although the white settlers make up less than two per cent of the population, they still control the political and economic affairs of large parts of the continent. The only really sizeable groups of white settlers are the French in Algeria and the English-Boer group in South Africa. However, every African colony has some settlers from the European mother country. Along the east coast, especially near Zanzibar, there are many descendants of Arab traders. An important minority of Indians (not North American Indians) is found in the Natal province of the Republic of South Africa and in East Africa. Most of this group came from India to work on plantations or to establish trading businesses.

Religion and Language The majority of the Negroes of Africa still practise pagan religions, complete with witch doctors. Most of the Caucasian peoples follow the Moslem religion, although the people of Ethiopia are mainly Christians. The Europeans are also predominantly Christians, and their missionary work has won many converts among the negro Africans. Over 600 different languages and dialects are spoken in Africa. This great diversity of languages makes the development of modern methods of education and communication difficult.

Conclusion The effects of many centuries of primitive life have not yet been overcome in Africa. Except where Europeans have introduced and developed modern methods of education, government, and ways of making a living, conditions are still poor. The great majority of both native whites in North Africa and negroes of Central and South Africa are unable to read and write. Many still live under primitive tribal organizations and have few political skills and privileges. Most are ruled either by Europeans or small groups of educated Africans. The general lack of education and political knowledge among African peoples make the efficient operation of democratic government very difficult.

Underdevelopment of the continent's resources has left the people with a generally low standard of living. Most of the mines, plantations, and factories are owned and managed by Europeans, who enjoy a comparatively comfortable standard of living. The natives who work for the Europeans usually have more comforts of life than those who work on their own. A type of farming known as *subsistence agriculture* is the occupation of most Africans. Under *Fig. 5* this type of farming the people are able to grow only enough to meet their own needs, with little or nothing left to sell. Without the money that such sales would bring, the people are unable to buy the things that Canadians are accustomed to having. Millions of Africans live in homes that lack electricity, gas, or running water, *Fig. 6* so that sinks, bathtubs, toilets, refrigerators, vacuum cleaners, washing machines, radios, television sets, electric lights, and telephones are uncommon. Clothing is often homemade, and food is usually that obtained from the herds or farmlands of the people themselves.

Great progress is now being made in the improvement of the levels of education, political maturity, and economic welfare of the African people, but much still remains to be done.

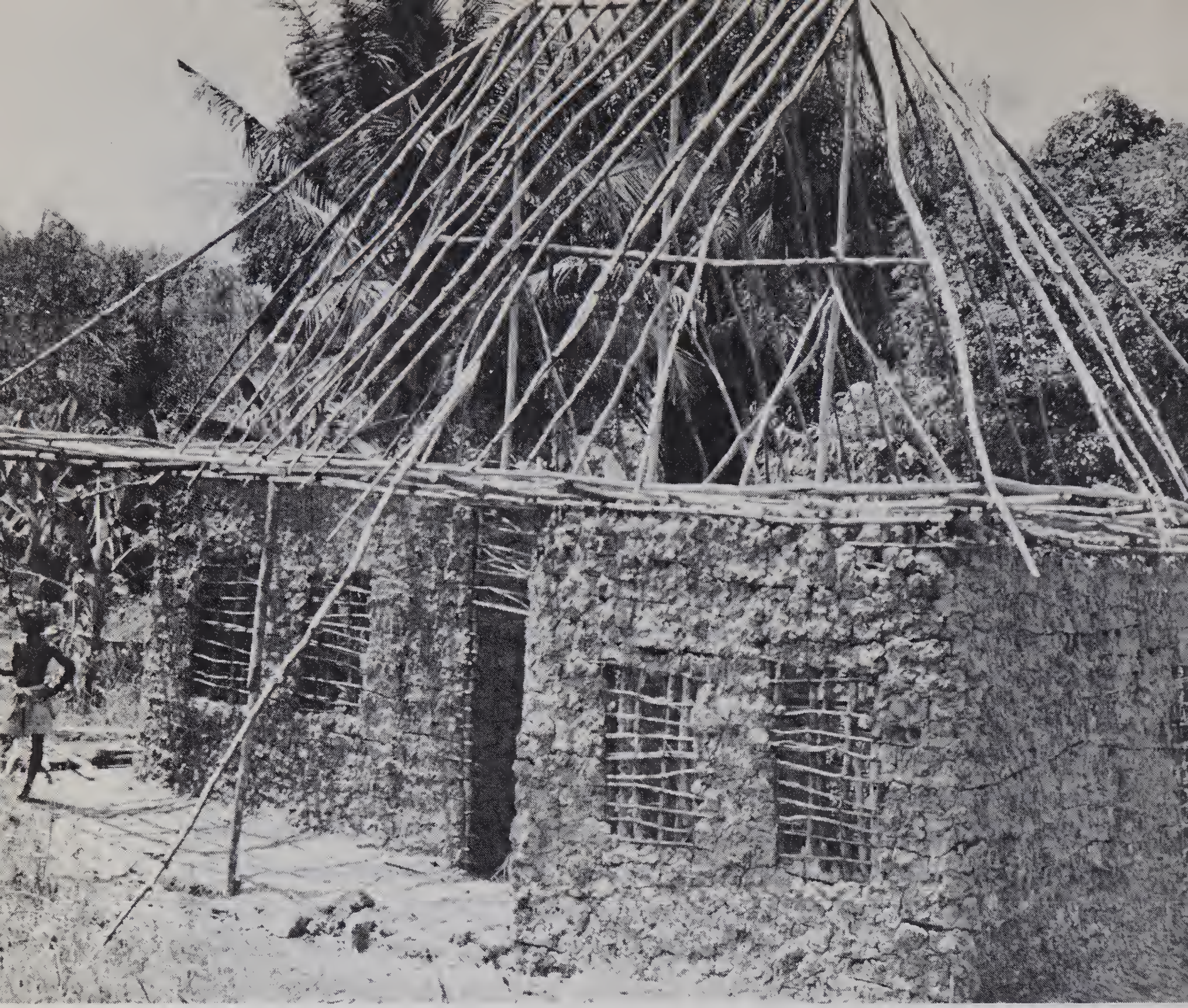


Figure 6. A Native Home Under Construction.
Like most native homes, this house is being constructed of materials that are obtained locally. The poles for the framework have been cut nearby, the walls are made of sun-dried mud, and the roof will be thatched.

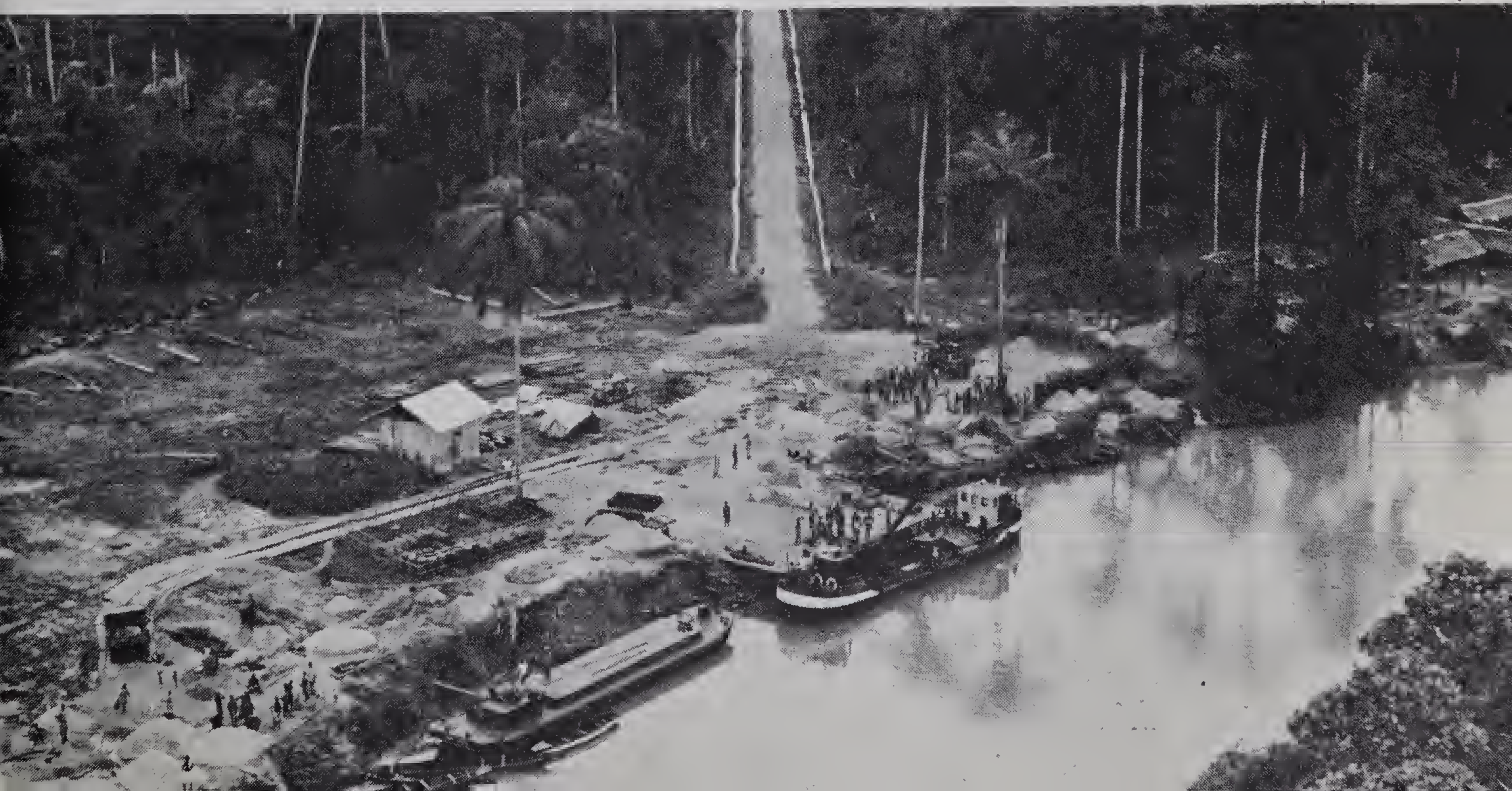
TRANSPORTATION AND COMMUNICATIONS

If the whole continent of Africa is considered, both transportation and communications are poor. Compared with North America, transportation systems are not well developed. Only the Republic of South Africa has an adequate system of roads and railroads. Indeed, the Republic has two-thirds of all the automobiles in Africa and more freight cars and telephones than all the rest of Africa combined.

Although railway building started in Africa at about the same time as it did in Canada, progress has been very slow. Railway lines are usually built only when there is sufficient economic development in an area to provide passenger and freight revenue to pay for the costs of building and operating the line. In Africa economic development is so retarded that only a few areas are well enough developed to warrant the building of a railway system. Many sections of the continent are without adequate railway transportation and will remain so until more development of resources takes place within those regions. Most of the present rail lines in Africa are short and either (1) link navigable waterways at places where the rivers are impassable or (2) join mining or agricultural developments to seaports.

River transportation, which was described under the *Rivers and Lakes* section, is important in some parts of the continent, and ocean shipping has always been significant in Africa. With the development of many new artificial harbours to overcome the lack of good natural harbours, coastal and ocean transport will continue to play a leading role. *p. 137* *Fig. 7*

Figure 7. Supplying an Oil Camp.
This picture illustrates the usual method of transporting people and goods to much of the interior of Africa. Supplies have been brought up the Niger River by river boat to this supply camp. A rough road has been built over difficult terrain to the drilling area.



Airlines link the main cities of Africa to those of Europe, and air transports have aided in the opening up of several otherwise inaccessible parts of the African jungle. However, since the extensive use of aircraft is profitable only where light, valuable cargoes and large numbers of paying passengers are in constant need of rapid transportation, the relatively undeveloped economy and impoverished peoples of Africa cannot support a large number of aircraft.

Cars, trucks, and buses have become more important than any other form of powered travel in Africa. Even the navigable waterways are yielding their place of importance to the motorized vehicle, with its ability to provide transportation in areas where rivers are unsuitable for navigation, and where the expense of building a railway would be unjustified. In many areas, the native walking paths have proven suitable for cycling, and the bicycle has become a very common means of transportation for the African people.

Only the Republic of South Africa, with a well-developed economy, has a modern system of communications, including telephone, television, radio, telegraph, postal service, and teletype. In other parts of the continent, it is only in the large modern cities and Europeanized rural areas that such means of communication are available.

WORK UNIT 8

The Language of Geography Add to your reference list definitions of the following terms: census, Sudanese, Bantu, subsistence agriculture.

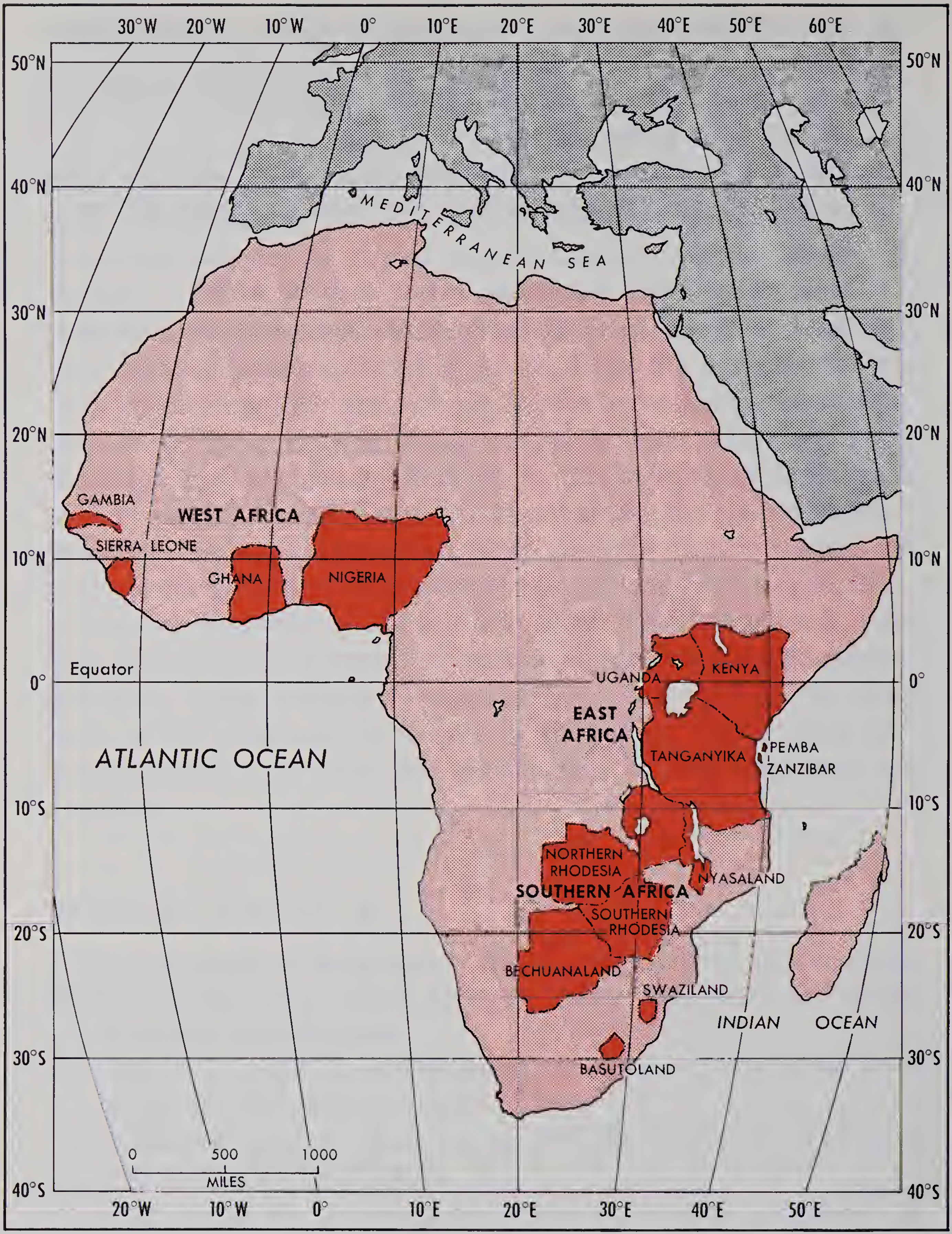
Problems and Projects

1. Obtain the population densities of the other continents and compare them with that of Africa.
2. Prepare a detailed report on (a) the life of the Bushmen, and (b) the life of the Pygmies.
3. What could Canada do to help improve the living standards of the average African native?
4. Why does Africa with its many jungles and deserts have a heavier population density than Canada?

5. Why will water and air transportation continue to be important in Africa?
6. What items that are taken for granted by Canadians are missing in most native African homes?
7. For what two main purposes were most railway lines in Africa built? Were any Canadian railway lines built for similar reasons?

Maps

1. Make a simplified population density map of Africa.
2. On an outline map of Africa mark the location of the main racial groups.


30°W
20°W
10°W
0°
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20°E
30°E
40°E
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50°N
40°N
30°N
20°N
10°N
0°
10°S
20°S
30°S
40°S
MEDITERRANEAN SEA
GAMBIA
WEST AFRICA
SIERRA LEONE
GHANA
NIGERIA
Equator
UGANDA
KENYA
EAST AFRICA
TANGANYIKA
PEMBA
ZANZIBAR
ATLANTIC OCEAN
NORTHERN RHODESIA
SOUTHERN AFRICA
NYASALAND
SOUTHERN RHODESIA
BECHUANALAND
SWAZILAND
INDIAN OCEAN
BASUTOLAND
0
500
1000
MILES

Map 8. The Commonwealth in Africa.

THE COMMONWEALTH IN WEST AFRICA

Three independent members of the Commonwealth and one British colony are located in West Africa. Ghana became independent in 1957, Nigeria in 1960, and Sierra Leone in 1961. Gambia is still a colony of the United Kingdom. Sometimes called the African Giant, Nigeria is the largest country in West Africa. It is almost four times as large as Britain and has a population of almost 36 million, which is about twice the population of Canada. Ghana has almost 7 million citizens and is about one-third the size of Alberta. Sierra Leone has more than 2½ million citizens and an area similar to that of New Brunswick. Gambia is about twice the size of Prince Edward Island and has a population of 320,000.

The people of Ghana are among the most prosperous and best educated people in Africa, and their per capita income is much higher than those of other African and Asian countries of the Commonwealth. Ghana also has one of the highest adult literacy rates in Africa and, for a young country, has a large number of university graduates. Britain granted independence to Ghana before most of its other African territories because of these favourable conditions and because Ghana had none of the serious problems found in most other African countries.

Nigeria is actually a federation of three political areas. They are the Northern Region, Western Region, and Eastern Region. As in Canada, each region has its own government with a central government for the country as a whole. Few adult Nigerians can read or write, but a great effort is being made to educate the children. Nigeria is doing a better job than most other African nations in providing its people with schooling.

Sierra Leone was once a raiding ground for slave traders. After the slave trade was abolished, the British government made Sierra Leone a home for freed slaves, and many of Sierra Leone's present-day citizens are their descendants. They form part of a minority group, known as the Creoles, who regard themselves as superior to the native inhabitants of the country. Unlike most Sierra

Leoneans, the Creoles are well educated, speak English, and are mainly Christian. Most of the native tribesmen of the country are illiterate, speak an African language, and are either Moslems or pagans.

LANDFORMS AND DRAINAGE

The coasts of West Africa are low-lying with numerous shallow lagoons enclosed by sandbars. The lagoons offer sheltered waters for fishing and for small-scale shipping in native craft, but the lack of deep water prevents large ocean vessels from coming close to shore. In most places, small surf boats must be used to carry goods to and from freighters anchored in deep water offshore. *Map 11*

Nigeria consists of an interior plateau and a coastal plain along the Gulf of Guinea. The plateau region averages 4,500 feet in elevation and has a rolling surface. To the northeast, the land slopes gently down towards the Lake Chad Basin. In the southeast, the surface is mountainous and the volcanic peak of Cameroon Mountain rises to 13,350 feet. The main feature of the coastal plain is the 14,000-square-mile delta of the Niger River. Like most deltas, its flat surface is dotted with swamps and crossed by a maze of streams.

Nigeria receives the surging waters of the 2,600-mile Niger River from the northwest. As the mighty river flows across Nigeria to the sea, it is joined by numerous tributaries. Largest of these is the Benue, which drains much of eastern Nigeria. The Niger and the Benue are both navigable for some distance upstream. The Niger offers year-round transportation, but the Benue is navigable only during the wet season. Good power sites are available on several Nigerian rivers at rapids and waterfalls where the water descends from the interior plateau region. Some of these sites have already been harnessed, but a large potential still remains to be developed.

Map 10 Unlike Nigeria, *Ghana* is generally low and rolling. Almost all of Northern Ghana and most of the southeast consists of the low-lying Volta Basin, which is less than 1,000 feet above sea level.

Large sections of the Volta Plain are subject to frequent flooding by the Volta River and its tributaries. A rim of rough and hilly land almost encloses the basin. In the north, a plateau region rises to 1,500 feet. To the southwest is the low, rolling Ashanti Plateau, which separates the Volta Basin from a narrow coastal lowland. Only 20 to 60 miles in width, Ghana's coastal plain is much narrower than that of Nigeria. Although most of the coast is low and sandy, the presence of rocky areas has made possible the construction of artificial harbours.

The Volta River system drains more than two-thirds of Ghana. Its numerous rapids and waterfalls are being developed to produce electricity, and its waters are being used to irrigate dry regions. The lower course of the Volta is navigable by steamers for almost 60 miles, but its upper course carries only local canoe traffic.

Sierra Leone has a low and swampy coastal plain. Inland, there is rolling country that rises to an upland plateau about 1,500 feet in height. Mountains rise above the surface of the interior uplands and also cover much of the peninsula on which Freetown is situated. Numerous small rivers that reach the coast are widely used by launches and canoes during the wet season. *Map 9*

Gambia is a narrow, 300-mile-long strip of land bordering both banks of the Gambia River. The width of the strip varies from 7 to 12 miles. Low-lying swamps and grasslands fringe the course of the river. Away from the Gambia, the land rises gradually to a level surface about 100 feet above sea level. The river is the principal means of transportation. Large vessels can go 150 miles upstream, and launches and canoes can travel 288 miles from the mouth of the river. *Map 12*

CLIMATE

Reference to the "Climatic Zones" map shows that Sierra Leone and the southern sections of Ghana and Nigeria are in the Wet Tropics. Review the description and explanation of this type of climate. The "Climatic Zones" map also shows that Gambia, and the northern sections of Ghana and Nigeria have a Tropical Savanna climate. Also review, therefore, what was written earlier about the *Map 2*

Tropical Savanna, or Wet-Dry Tropics. Notice also on the "Climatic Zones" map how close northern Nigeria lies to the great *Map 3* Sahara Desert. What does this suggest about rainfall in northern Nigeria? Verify your answer by studying the "Annual Rainfall" *Maps 4-5* map for Africa. The "Average Temperature" maps of Africa for January and July reveal the tropical nature of the West African climate. Note how close these countries are to the equator. Keep

Figure 8. A Watering Place on the Niger River.
A shortage of water is one of the major problems in the northern part of the region, so even this small arm of the Niger plays an important and varied role. The boat is transporting a load of hay which is to be fed to camels, and Sudanese negroes are bathing and washing clothes.

in mind as you study the maps for the entire continent that they are very generalized since they deal with a huge land mass. Exceptions to the general pattern shown on the climatic maps occur most often in highland areas. Refer again to the General Geography section at the front of the book to review the effects that highland areas have on temperature and rainfall. *p. 16*

Several coastal regions of West Africa are very wet, especially from May to November when they lie in the path of the moisture-laden winds from the ocean. Southeastern Nigeria gets more than 100 inches of rain annually, and the coastal regions of Sierra Leone average more than 130 inches. The lower slopes of Cameroon Mountain in southeastern Nigeria receive an amazing 360 inches of rain a year! This figure contrasts sharply with rainfall figures for the extreme north of Nigeria, where less than 20 inches of rain fall in a normal year. Because it lies closer to the sea than northern Nigeria, northern Ghana gets more than 40 inches of rain. *Map 3* The value of the rainfall in these northern areas is greatly reduced by the fact that most of it comes from June to October. The long dry season from November to May is made worse by the "harmattan", a hot, dry and dusty wind that blows steadily from the Sahara in the winter months. To a lesser extent, the harmattan also affects the coastal regions, including those of Sierra Leone. Not shown on the generalized rainfall map of Africa is a relatively dry area around Accra in southern Ghana. Unlike the other coastal areas, this region averages less than 40 inches of rain.

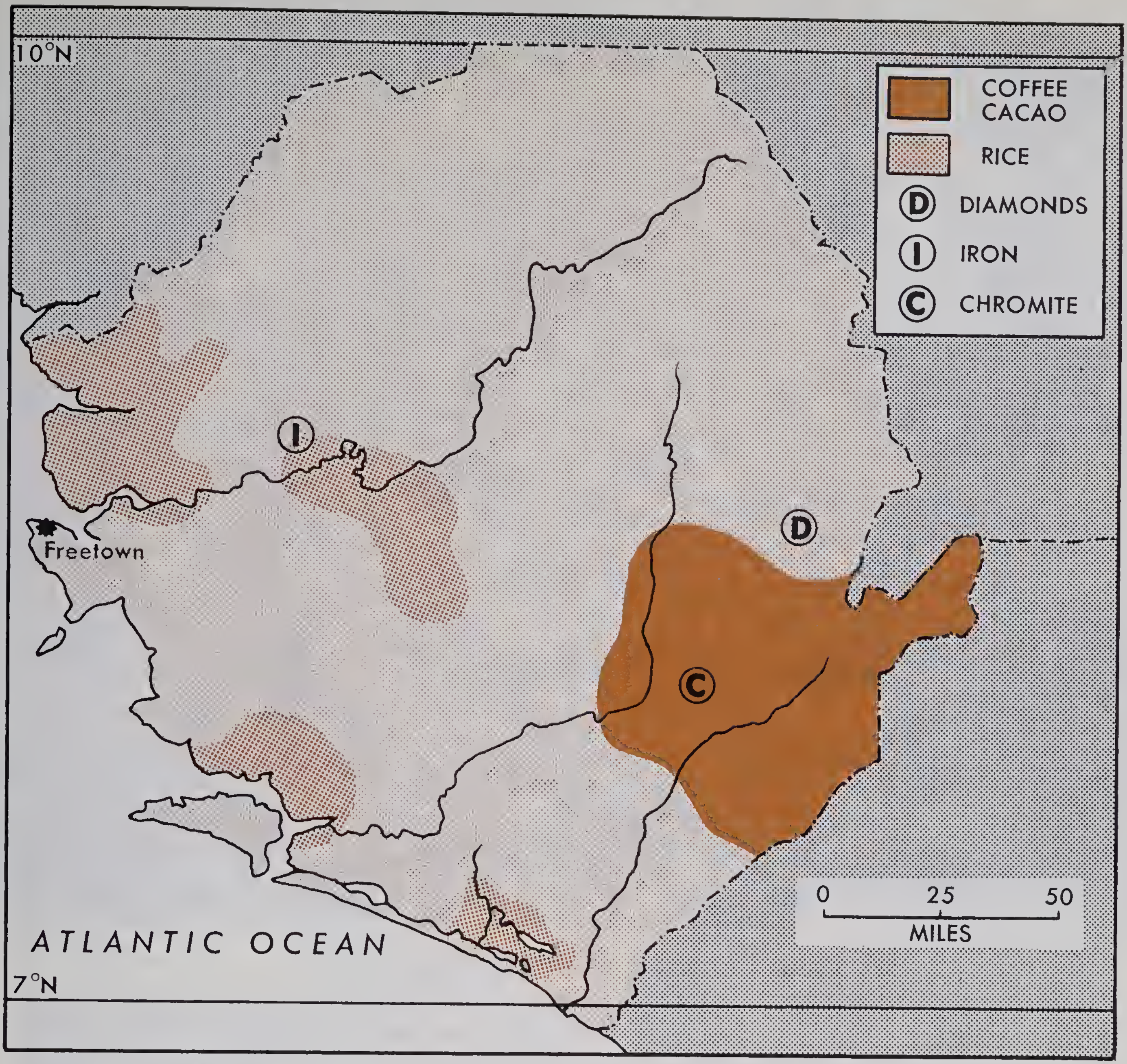
VEGETATION

In the study of Africa as a whole, we learned about the vegetation of the continent. *Map 6* Refer again to that section of the text. The "Vegetation" map reveals that parts of Nigeria, Ghana, and Sierra Leone are covered by tropical rainforests. Review now what has already been said about typical rainforest vegetation. *pp. 124, 125* Dense mangrove swamps choke the generally low and sandy coasts of Nigeria, Sierra Leone, and southeastern Ghana. Study your "Vegetation" map to discover what type of vegetation zone occupies the interior regions of Ghana and Nigeria; then read about the characteristics of that type of vegetation. Why do those regions support large numbers of cattle, sheep, and goats? Compare the "Vegetation" map with the "Climatic Zones" map to see what effect climate has upon the vegetation pattern. How is the dry zone in southern Ghana indicated on the vegetation map?

RESOURCES AND INDUSTRY

Agriculture The production of tropical products, for both home use and foreign trade, dominates the work of the West African people. In the hot, wet forest zones, yams, sweet potatoes, cassava (a plant grown for its fleshy edible rootstock, which contains a nutritious starch), several other types of vegetables, and bananas are grown on small native farms for local food supplies. Rice is another important food crop grown for home use in areas where *Map 9* water for irrigation is available. It is the main food crop in Sierra Leone. The small native farms of the rainforest area also provide large quantities of cocoa, palm oil, and palm nuts for export. In the interior grasslands, where the winters are dry, native African farmers raise millet, wheat, and Guinea corn for themselves, and peanuts and cotton for export. The drier zones are also suitable for raising herds of goats, sheep, and cattle. The presence of the tsetse fly in the damp tropical forests makes cattle-raising impossible near the coast. Common in all the hot, humid zones of Africa, this dreaded insect carries and transmits by its bite a parasite that causes nagana, a disease that is fatal to cattle.

In the forest and the damper parts of the savanna, the farmers practise a type of agriculture that is called *shifting cultivation.* Under this system, the farmers, who usually own about 20 acres of land, have only about 5 acres under cultivation at any one time. After two or three years of exposure to the drenching rains of the tropics, the thin, poor soil loses most of its fertility and becomes infested with weeds that choke out the struggling crops. The cultivated area is left untilled and allowed to regain a natural tropical undergrowth; many years later it will be ready to burn and cultivate again. In the meantime, the farmer cuts and burns the jungle vege-


10°N
COFFEE
CACAO
RICE
D DIAMONDS
I IRON
C CHROMITE
I
D
C
Freetown
ATLANTIC OCEAN
7°N
0
25
50
MILES

Map 9. Sierra Leone.

tation off another 5 acres of his holdings for crop production. The ashes of the burned vegetation help to fertilize the soil. Although untidy and wasteful by Canadian standards, this method does help to overcome the severe erosion of top-soil and staggering loss of fertility that would result if North American agricultural methods were applied to tropical farmlands. The unfortunate feature of the system is the low crop yield obtained, due to a greater loss of plant food by the burning process than the ashes provide. This type of agriculture leaves so much land unproductive that only a small number of people can support themselves in this way on a given amount of land.

Cocoa—Large red or yellow pods growing on the trunks and branches of cacao trees each yield 30 to 40 "beans" that are used *Fig. 9*

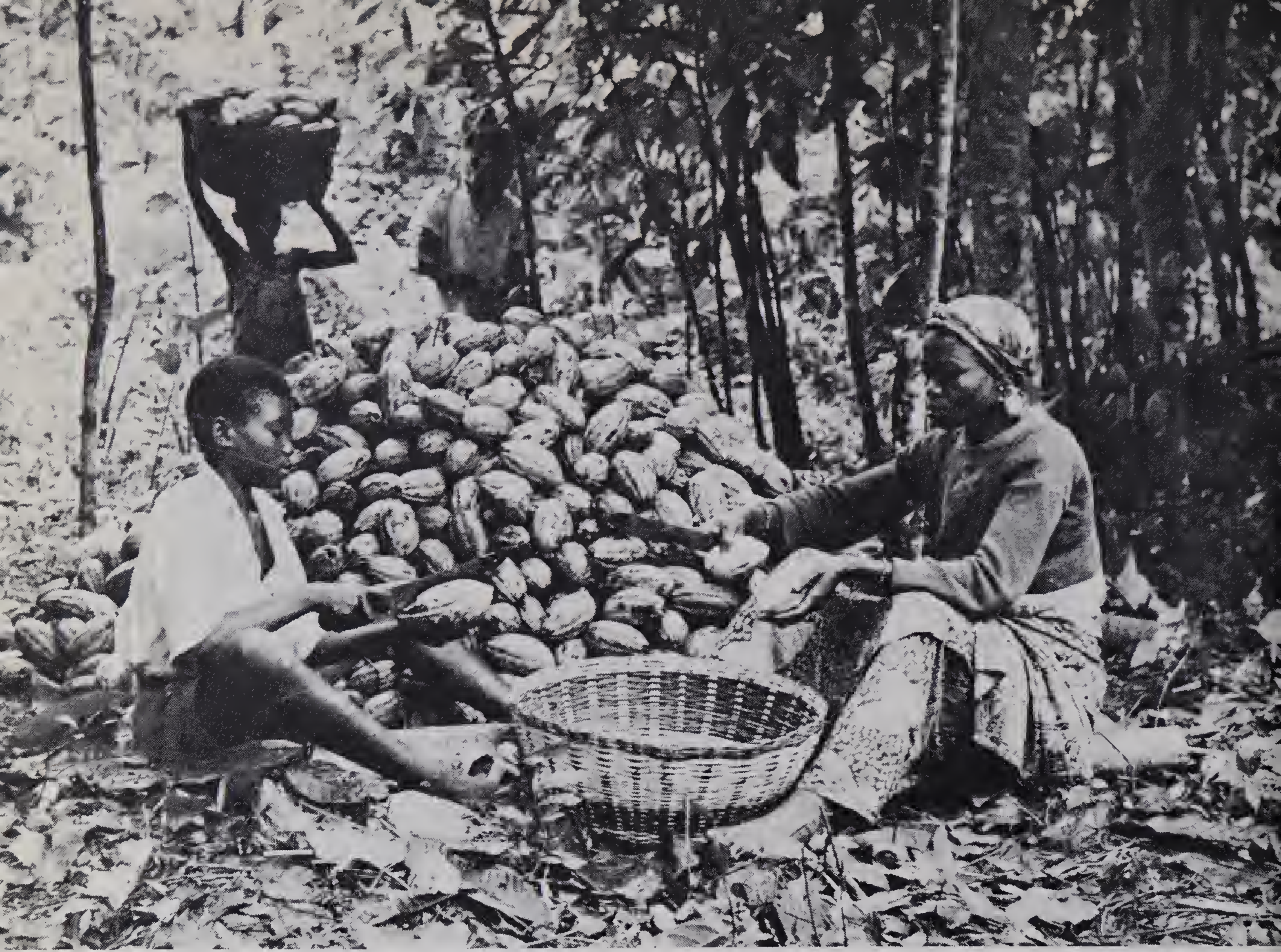


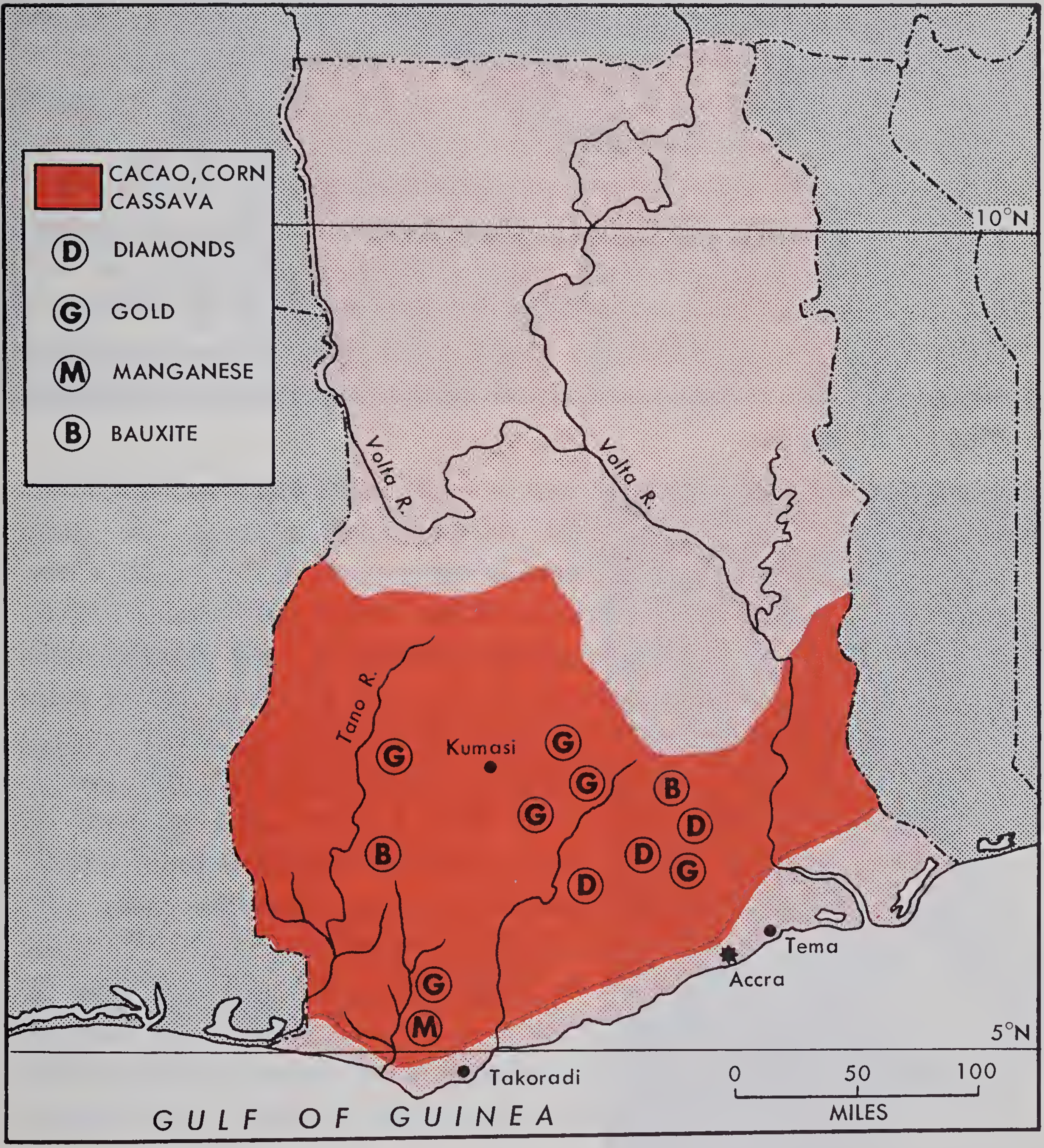
Figure 9. Breaking Cocoa Pods in Ghana.
The cocoa pods must be broken open to extract the beans which are then dried and processed for chocolate or cocoa-powder. Unlike most areas of tropical agriculture, the cocoa crops are produced on small native farms rather than large, foreign-owned plantations. On these farms all work is done by hand methods.

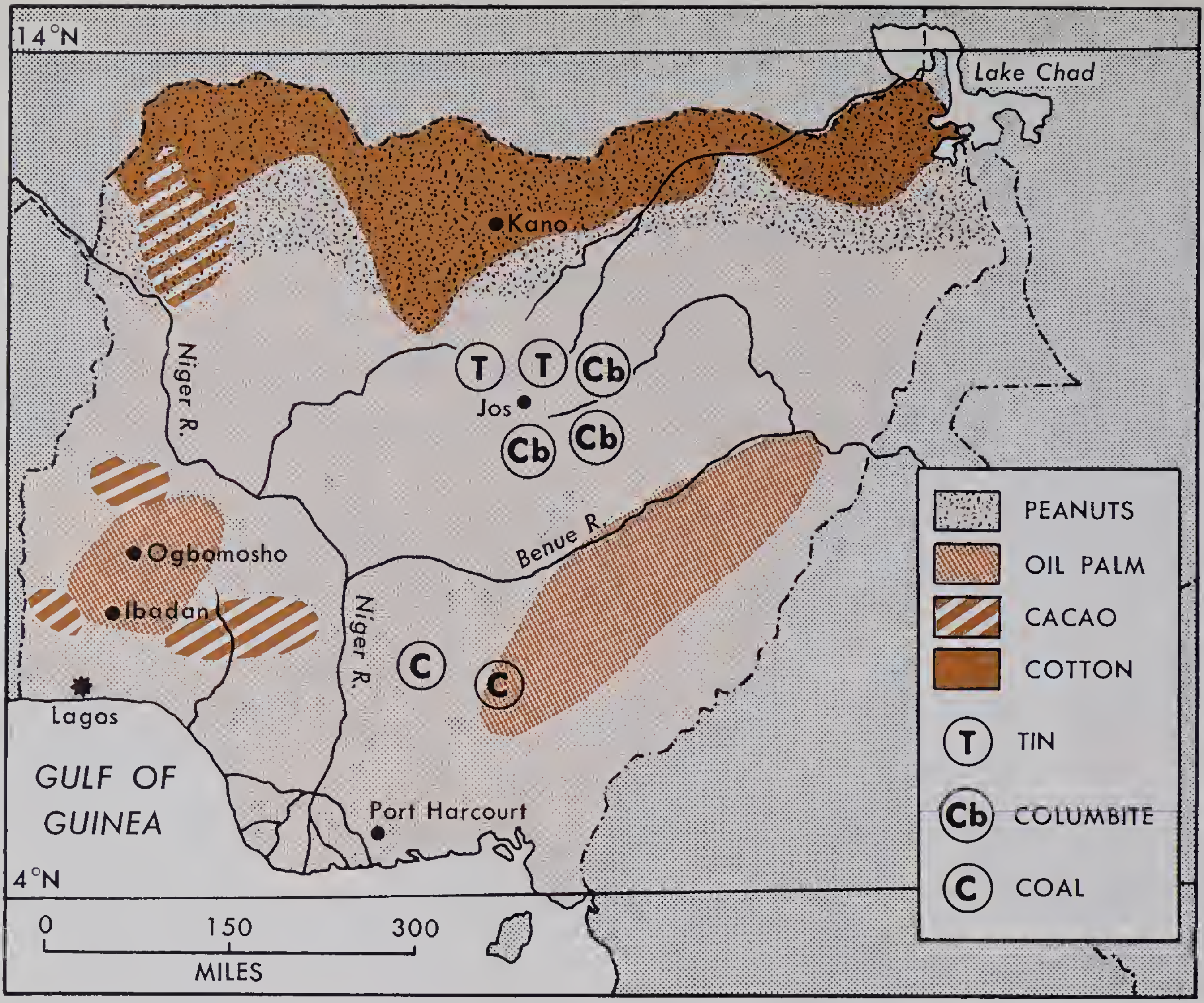
to make cocoa and chocolate. The forest zone of West Africa provides ideal conditions for the growth of cacao trees, which require a hot, moist climate and much care and protection. When the West African Negro farmers make clearings on their small farms to plant cacao seedlings, they leave the larger forest trees standing: in order to survive, cacao trees must have shelter from the hot sunshine, heavy rains, and violent winds of the tropics. Bananas and other tall crops, planted among the cacao trees, also shelter the young seedlings and provide food for the farmer and his family.

This pattern of small native-owned farms is unusual in most regions producing tropical products. Tea, coffee, rubber, coconuts, and other tropical products are usually grown on large commercial plantations, operated on a scientific basis with the help of hired native workers. Under this system, the owners and managers of the plantations are in many cases Europeans, Americans, or members of a race not native to the producing area.

Ghana produces over one-third of the world's cocoa and Nigeria another one-sixth. North America and Europe buy most of the cocoa crop. *Maps 10-11*

Map 10. Ghana.


🟥 CACAO, CORN CASSAVA
Ⓓ DIAMONDS
Ⓖ GOLD
Ⓜ MANGANESE
Ⓑ BAUXITE
10°N
5°N
Volta R.
Volta R.
Tano R.
Kumasi
Accra
Tema
Takoradi
G
B
D
M
GULF OF GUINEA
0 50 100
MILES



14°N
Lake Chad
Kano
Niger R.
Jos
Benue R.
Ogbomosho
Ibadan
Niger R.
Lagos
GULF OF GUINEA
Port Harcourt
4°N
0
150
300
MILES
PEANUTS
OIL PALM
CACAO
COTTON
T TIN
Cb COLUMBITE
C COAL

Map 11. Nigeria.

Palm Oil and Palm Kernels — Oil palm trees are native to the hot, wet forests of West Africa, and, although oil palm plantations have been established in other parts of the world, Commonwealth and other countries of West Africa still produce about three-quarters of the world's supply of palm oil and palm kernels. The large clusters of plum-shaped fruits that grow on the oil palm trees contain a pulpy material which yields palm oil when crushed and boiled. The fruits also contain hard, nut-like kernels that provide a valuable oil when opened. The West Africans who tend the oil palm trees must (1) thin jungle growth that threatens to "smother" young oil palm trees, (2) gather and crack open the fruits, (3) extract the palm oil, (4) collect the palm kernels, and (5) sell the palm oil and palm kernels to traders who export them. The oil from the fruit and kernels is used to make margarine, soap, candles, and other products that contain vegetable oils. Some commercial oil palm plantations have recently been set up in Ghana and Nigeria. *Map 10*

They produce a better quality palm oil with a higher yield per tree than is obtained from the wild trees in jungle areas.

Nigeria is one of the world's leading producers of palm oil. Nigeria also exports considerable amounts of palm oil and kernels. *Map 11*

Peanuts — (also known in other lands as groundnuts and monkeynuts). Peanuts grow well in the sandy soils and summer rain conditions of the savanna zone, where they are valuable to the natives as both food and a source of cash income. Although West Africa provides only one-eighth of the world's peanuts, they are very significant in the lives of the people in certain sections of West Africa. In Gambia, for example, they account for over nine-tenths of the exports and are practically the sole source of money for the people. Northern Nigeria also specializes in peanut-growing. *Map 12*

Peanuts are not really nuts. They are the seeds of a small shrub belonging to the pea family. The stalk of the peanut plant bends over so that the pods containing the "nuts" can grow in the ground around the plant roots. After harvesting and shelling, the peanuts form a popular human food. When crushed, they provide a useful vegetable oil and a residue that serves as a nutritious feed for cattle. *Fig. 11*

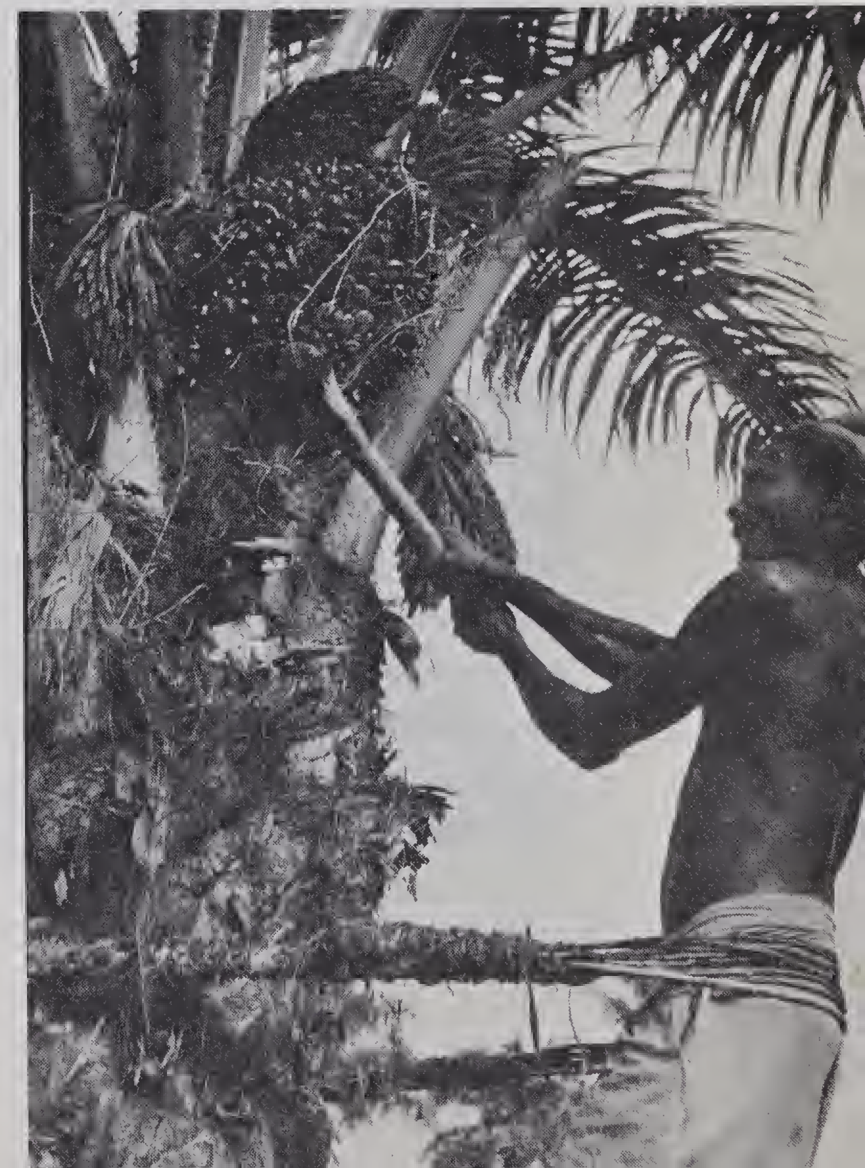
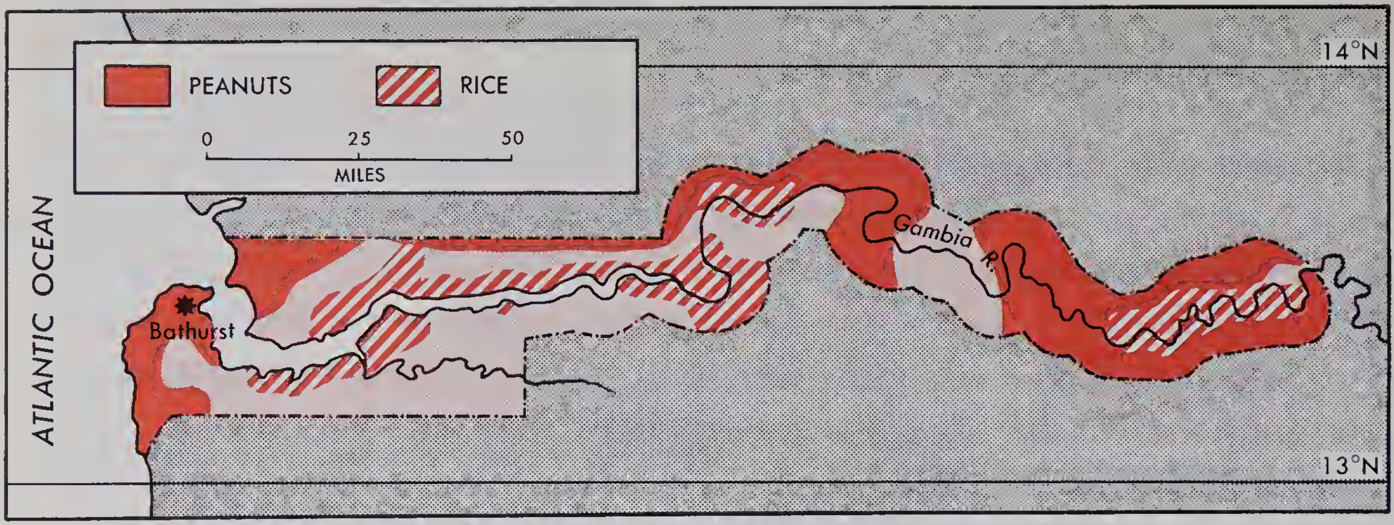


Figure 10.
Cutting Fruit from a West African Oil Palm.
The fruit of the oil palm grows in large, tightly-packed clusters which often weigh as much as a hundred pounds. The oil extracted from the fruit is used in the manufacture of soap, margarine, and candles. West African countries produce about three-quarters of the world's supply of palm oil.



Map 12. Gambia.

Other Agricultural Products Grown for World Trade—The production of coffee has increased rapidly in recent years. Coffee is now grown in Sierra Leone and Ghana.

Map 11 Cotton and tobacco are grown in northern Nigeria. Bananas are grown both for export and as a domestic food crop. Ginger is an important product of Sierra Leone.

Summary—Except for cocoa and palm oil, the tropical products of West Africa are not important in terms of world supply. Coffee, cotton, tobacco, bananas, ginger, and the other products mentioned as being exports of West Africa are produced in much larger quantities in other areas of the world, where special local conditions favour the production of certain types of crops and raw materials. Most of the food crops grown in the region are eaten by the inhabitants, leaving little surplus for export.

Forest Products In addition to the cacao and palm oil tree crops already described, the forests of West Africa yield other useful products. Copra, the dried flesh of coconuts, is a minor export of Ghana. Piassava, the fibre of the raffia palm, is exported from Sierra Leone for use as bristles in brushes and brooms. Wild kola and shea nuts are gathered in large numbers in the forests for local use and foreign trade. The kola nuts are gathered along the northern edge of the tropical forest zone, while the shea nuts are found in the savanna zone. Small amounts of wild rubber are also gathered.

Mahogany, for logs and lumber, and other tropical hardwoods, for veneers and plywoods, are taken from the forests. Timber pro-

Figure 11.
Sacks of Peanuts in Northern Nigeria.
In 1946 the British government embarked on a large scheme for growing peanuts in British Africa which failed for a curious reason: the weight of modern machinery used for cultivation packed down the earth so that the plants did not thrive; the relatively primitive methods of the natives proved to be the most effective.

ducts account for ten per cent of the exports of Ghana and a smaller percentage of those of Nigeria.

Fisheries West Africa is not an important fishing area in terms of world trade, but it does have many local coastal fisheries. In Ghana and other areas where roads have been constructed, fleets of trucks transport fresh fish for sale as far as 300 miles inland. In areas where roads are few and of poor quality, the market is limited to the sale of dried fish to farmers who live within a few miles of the small coastal villages. The size of the catch is limited by the use of crude gear and the lack of large, powered boats. Fish is important as a source of protein in the diet of the coast dwellers because meat and dairy products are scarce. Inland, many edible fish are taken from the numerous rivers.

Minerals and Power Mining is surpassed in importance only by
Map 10 agriculture in the economy of West Africa. Ghana has commercial deposits of gold, industrial diamonds, manganese (a mineral used to harden steel), and bauxite (a rich aluminum ore). Gold is exceeded in value only by cocoa as a product of Ghana, and the country ranks third in world manganese production. Indeed, minerals account for 30 per cent of Ghana's exports.

Map 11 Nigeria mines 20 per cent of the world's tin, most of the free world's columbite (an ore yielding columbium, a metal used in making heat resistant steel alloys), and small amounts of coal. Sierra Leone has deposits of iron ore, diamonds, and chromite, the source of chromium.

As yet, little power has been developed in West Africa, but the rivers of the area offer a large potential of hydro-electricity. Ghana and Nigeria each have hydro-electric developments, and Sierra Leone has small amounts of thermal power (produced by burning coal). Until more electric power can be generated, the development of industry and modern home conveniences will be slow.

Ghana is attempting to complete an ambitious scheme known as the Volta River Project. The project involves the construction of a dam and a hydro-electric power station about 70 miles from the mouth of the Volta River and an aluminum smelter a few miles from the power plant. Bauxite for the smelter is to be obtained from
Map 10 large deposits in Ghana. When built, the dam will create a reservoir about 2,000 square miles in size, making it one of the largest artificial lakes in the world. The scheme also provides for water from the Volta to be used for irrigating the Accra plains.

Manufacturing The work carried on in the few factories that have been built is largely restricted to processing raw materials for local use. Examples of this type of industry are saw mills, cigarette factories, breweries, soft-drink bottling plants, and plants producing soap, matches, and nails. Facilities to produce cement and refine vegetable oils are being increased. Bicycle assembly plants are important among the recent developments. Handicrafts and cottage industries, such as blacksmithing, woodworking, and weaving, are common in most of the villages. However, the general lack of power, skilled labour, money for investment, raw materials, and a strong local market will keep manufacturing small by world standards for many decades.

TRANSPORTATION

The main roads and railways of West Africa do not form a continuous network. Many areas are without modern transportation, so that travellers must go by canoe, on foot, on horseback, or by bicycle. Although some main roads are hard surfaced, most local roads have dirt surfaces that become impassable during the wet season. Rail links have been built only between the larger cities or to serve important mining and farming districts. Gambia has no railway, and Sierra Leone and Ghana have few lines serving the interior. Nigeria has the best network of railways in West Africa.

Shallow-bottomed river steamers travel the lower courses of several rivers, such as the Niger, Benue, and Volta. However, periods of low water shorten the shipping season, and sections of rough water limit the use of upper river courses to small native craft. Some of the rivers are used to float logs from the tropical forests to mills and ports.

Air services link the major centres, and several West African cities have international airports. Chief among these are Kano in Nigeria and Accra in Ghana.

TRADE

Tropical agricultural products and minerals are the chief exports of West Africa. The principal buyers of these products are Western Europe and the United States. Britain is the chief trading partner of all the Commonwealth countries in the region, both as a customer and as a supplier. The accompanying table lists the major exports of each country in the region. The chief imports are machinery, bicycles, buses, trucks, European foods, textiles, and chemicals. *p. 166*

Canada buys cocoa, palm oil, and a few other tropical products from West African countries and sells to them small quantities of food products and manufactured goods. None of the countries of the region, however, is among Canada's leading trade partners.

Much less than one per cent of Canada's total trade is conducted with West Africa.

Trade Summary

Country	Leading Export Products in Order of Value
Nigeria	Palm kernels and palm oil, cocoa, peanuts, tin, rubber, cotton
Ghana	Cocoa, minerals (gold, diamonds, manganese), timber
Sierra Leone	Diamonds, iron ore, palm kernels, coffee, cocoa, piassava
Gambia	Peanuts, palm kernels

THE PEOPLE

West Africa does not have the serious race problems of East and South Africa because there are few non-African settlers in the region. This is one of the main reasons why West African nations gained their independence before Kenya and the Rhodesias, which have many non-African settlers. Whereas the pleasant climate of the highlands in East and South Africa attracted many Europeans, the unpleasant and unhealthy weather experienced in most parts of West Africa discouraged settlers from staying. The great majority of the West African people are Negroes of the Sudanese type whose ancestors have long dwelled in the region. Ghana's population is 99 per cent Negro. Most Nigerians are also Negroes, although there are some Arabs and Hamitic people in the north. Only about 3,000 of the 2½ million Sierra Leoneans are white; the rest are native Africans or members of the 30,000-strong Creole group described earlier.

Although there are about 45 million people in the West African *Map 7* countries of the Commonwealth, population density is less than 100 persons per square mile. This figure is low compared to the density

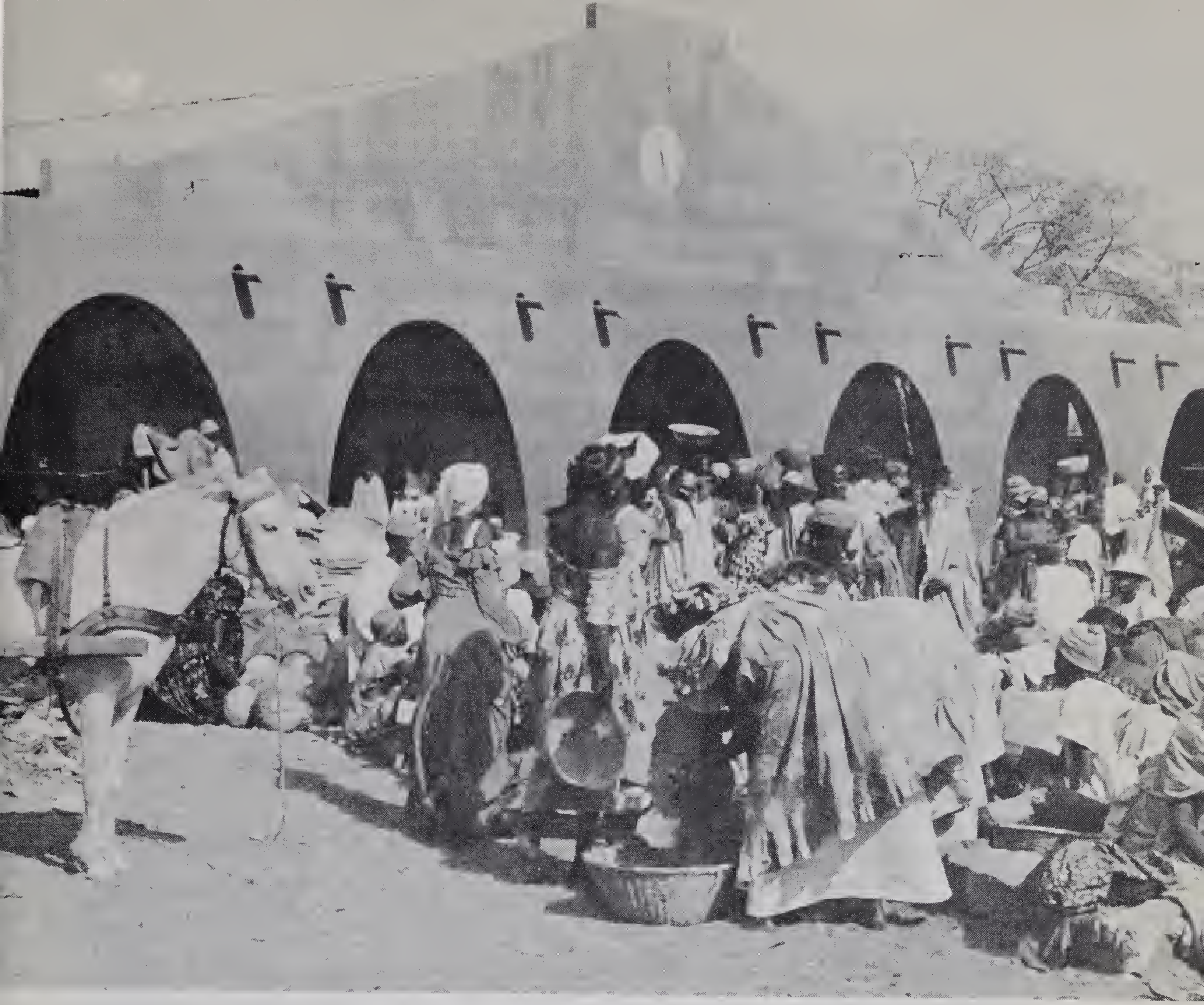


Figure 12. A Native Market in the Drylands of West Africa. *The climate in this region is generally warm and clear, so food, clothing, and other articles can be sold in open-air markets. In such a climate cheap cotton cloth is a suitable fabric for clothes. The clock and the printed cottons indicate a European influence.*

found in Britain, but high compared to densities found in most other parts of Africa.

Trade and government affairs are usually conducted in English, the language most used by the well educated. However, the majority of the people still speak native languages. Many different languages and dialects are used among the hundreds of tribes living in the region.

Subsistence farming and livestock raising are the main occupations in the savanna regions of the interior. In the forest zones the majority of the people grow or collect tropical products for home use or export. The number of miners, lumbermen, fishermen, and factory workers has been increasing steadily in recent years as the resources of the region become better developed.

Most of the people live in villages and are organized into primitive groups called tribes. Each village is ruled by its own chief. The villages usually consist of a cluster of small huts made of mud and straw and roofed with corrugated iron or thatch. These simple homes normally have no running water or electricity. Only in the cities are there modern buildings of brick and cement, and even there many homes are humble shanties or tin sheds. The women dress in brightly coloured cotton clothes. Except in Ghana, where native costume is still worn, most of the men wear western-style clothes.

The tribal organization of the people creates a serious problem for the leaders of the young countries of West Africa. In most cases, the people are more concerned about tribal than national affairs. Their first loyalty is to their tribe and its leaders rather than to their country and its welfare.

Many West African customs seem strange to Canadians. Men often have more than one wife. There are no old people's homes, since even sick and feeble elders are cared for in the homes of their children. Many people still paint their bodies and perform primitive tribal dances. Educated workers in the cities often spend a large part of their income on less-fortunate relatives who have remained on the tribal lands.

Pagan beliefs and primitive superstitions are widely held by the tribal people. Although there are many Moslems in the interior grassland regions and numerous Christians in the coastal areas, many tribesmen still hold beliefs that are based on local superstitions and that involve strange practices. They believe that such things as trees, rivers, and animals have souls. Ancestor worship is common, and tribal leaders are often considered to have god-like qualities.

Customs and superstitions vary from tribe to tribe. Many of them are strange and fascinating, especially those associated with *ju-ju,* which is the magic attributed to charms. Members of the largest tribe in Sierra Leone, for example, hang animal teeth or tiny pieces of cloth over the doorways of their huts in the belief that such "charms" will bring bad luck to anyone who trespasses in their homes. Ju-ju usually involves many "magic" ceremonies performed before important events such as hunting trips, the planting of seeds, or the harvesting of the crops. Such ceremonies are designed to please the spirits so that they will not bring harm to the people, their children, or their crops. In some tribes, the women are not allowed to milk the cattle. In another tribe, newly born twins are killed because of a local taboo against such births.

CITIES

Although most West Africans still live in small villages, there are some fairly large cities in the Commonwealth countries of West Africa. *Lagos* (337,000) is the capital and chief port of Nigeria. Another major outlet of Nigeria is *Port Harcourt* (72,000) on the great delta of the Niger. Inland centres of some size and importance in Nigeria are *Ibadan* (500,000), the largest Negro city in the world, *Ogbomosho* (140,000), and *Kano* (130,000). Most interesting of these cities is Kano, a thriving centre of transportation and trade in the savanna lands of the north. It is surrounded by an ancient wall of red mud and boasts the largest native market in the world. Although it is over a thousand years old, Kano has a busy international airport and several modern factories.

Ghana's capital is *Accra* (150,000). Because large ocean vessels could not dock at Accra, a new harbour was recently constructed about 20 miles east of the city at *Tema*. It is the largest artificial harbour in Africa. *Takoradi* (44,500) also has a man-made harbour. Ghana's principal inland city is *Kumasi* (80,000), a transportation centre in the main cocoa-growing area.

Freetown (100,000) is the capital, chief port, and only major city of Sierra Leone. Unlike most of the ports of West Africa, it has a spacious natural harbour, which is one of the largest in the world. As a result, all the major roads and railways of Sierra Leone lead to Freetown, and it handles almost all of the country's foreign trade.

Map 12 Gambia's capital and only city is *Bathurst* (20,600). Situated at the mouth of the Gambia River, it is the country's only seaport.

CONCLUSION

The West African Commonwealth countries are important as world suppliers of tropical agricultural products. They are interesting as young nations trying to govern themselves in a democratic way. Economic, health, and education standards are low; and tremendous efforts will be needed to raise them to those now enjoyed by the more prosperous nations of the Commonwealth. The West African people have made a good start at solving their major problems, but they will need assistance if progress is to be rapid.

WORK UNIT —

The Language of Geography Add to or review in your reference list, definitions for the following terms: Creoles, lagoon, delta, savanna, harmattan, ju-ju.

Problems and Projects

1. Construct bar graphs to illustrate the size of the populations of West African countries.
2. How would African cities such as Ibadan differ from the capital city of your province?
3. Discuss the values of the Niger and Volta rivers to the people of Nigeria and Ghana.
4. Compare the number of inches of rain in your area with rainfall in: (a) Southern Nigeria; (b) Sierra Leone; (c) Northern Ghana; (d) Northern Nigeria.

Maps

Draw a population density map of West Africa. Use dots to symbolize population density. Perhaps one dot could represent 10,000 people.

THE COMMONWEALTH IN EAST AFRICA

Of the Commonwealth countries in East Africa, Tanganyika attained its independence in 1960, and Uganda became independent in 1962. Soon to receive its independence is the British colony of Kenya. Agreement on the form of government that will best suit Kenya when it receives its independence has not yet been reached. Now ruled by an Arab sultan, Zanzibar has been a British Protectorate since 1890. It consists of the two islands of Zanzibar and Pemba, which lie more than 20 miles off the coast of Tanganyika.

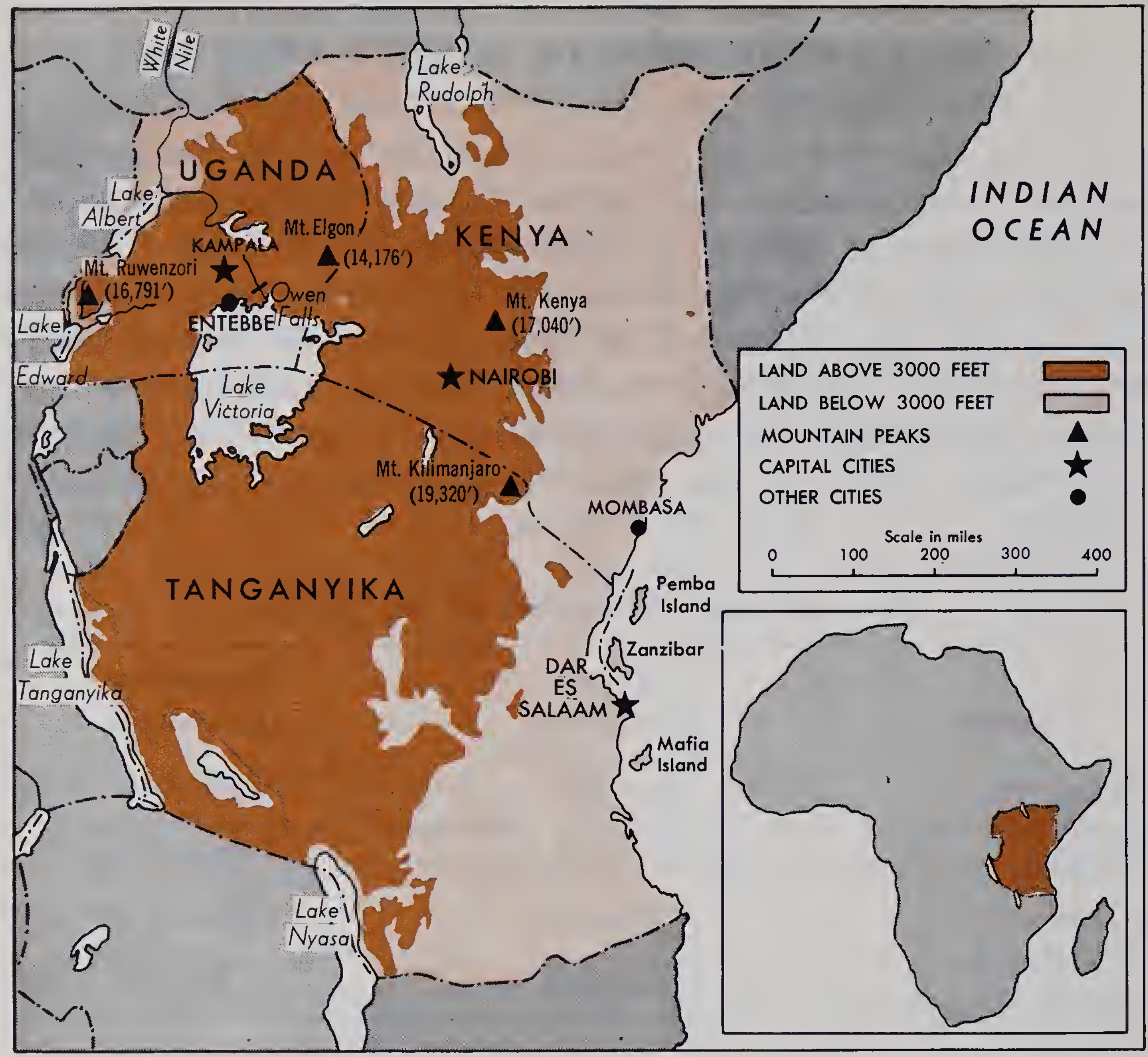
Commonwealth Countries of East Africa

Country	Area (in sq. mi.)	Population (estimated)
Tanganyika	362,000	9,500,000
Kenya	225,000	6,500,000
Uganda	94,000	6,700,000
Zanzibar & Pemba	1,020	300,000

LANDFORMS AND DRAINAGE

East Africa contains a large percentage of plateau lands. These highlands, averaging 3,000 feet above sea level, greatly modify the effects of the equatorial location by reducing temperatures, thus creating a large temperate area that appeals to Europeans. The annual rainfall of the highlands is not tropical either, except on the damp windward sides of mountains, averaging only 45 inches for the entire plateau region. Grasslands cover much of the highland surface, but the sections over 5,000 feet above sea level are usually forested. The narrow coastal plain contrasts sharply with the highlands in climate and vegetation. Except in the north, where there is a hot, dry climate and dryland vegetation similar to that of adjacent Somalia, the coastal lowland has the hot, wet climate and rainforest vegetation customarily found in lowland tropical areas.

Map 13


White Nile
Lake Rudolph
UGANDA
Lake Albert
KAMPALA
Mt. Elgon (14,176′)
Mt. Ruwenzori (16,791′)
Owen Falls
ENTEBBE
KENYA
INDIAN OCEAN
Mt. Kenya (17,040′)
Lake Edward
Lake Victoria
NAIROBI
Mt. Kilimanjaro (19,320′)
MOMBASA
TANGANYIKA
Pemba Island
Zanzibar
DAR ES SALAAM
Mafia Island
Lake Tanganyika
Lake Nyasa
LAND ABOVE 3000 FEET
LAND BELOW 3000 FEET
MOUNTAIN PEAKS ▲
CAPITAL CITIES ★
OTHER CITIES ●
Scale in miles
0
100
200
300
400

Map 13. East Africa.

Above the plateau surface rise the highest mountains in Africa, *Fig. 1* including several high volcanic cones like 19,320-foot Mt. Kilimanjaro. Some sections of the rift valleys that cross the region are filled with the great lakes of Africa, namely Lake Rudolph, Lake Albert, and Lake Tanganyika. Lying in a huge, shallow depression that straddles the Kenya-Tanganyika border, Lake Victoria is the main source of the Nile. Lake Albert, on the western boundary of Uganda, also drains into the Nile. The rivers of East Africa are small and of limited importance to the region.

The variation in elevation, ranging from snow-capped peaks and cool plateau surfaces, down to hot, wet rift valleys and coastal plains, gives East Africa a varied pattern of climate and vegetation.

RESOURCES AND INDUSTRY

Agriculture Most of the inhabitants of East Africa are dependent upon some form of agriculture. People of European descent produce most of the region's agricultural exports on their modern highland farms; while native Africans produce little more than their own needs on *subsistence* farms. The European mixed farms and plantations grow coffee, cotton, sisal, and other export crops. The African farmers raise beans, corn, cassava, sweet potatoes, and bananas on their small farms; and many keep a few cattle. An exception to this general pattern exists in Uganda, where African farmers produce cotton for export. *Fig. 14*

Coffee grows well in the highlands, where constantly warm, tropical weather, moderate rainfall, and good drainage provide ideal growing conditions for the coffee plants. Output is large enough to make coffee the main export of Kenya and one of the most important exports of Uganda and Tanganyika. Uganda is the largest coffee producer in the Commonwealth. *Map 14*

Sisal thrives on the drier edge of the plateau. The fibre of the sisal plants is used to make coarse rope and twine. Tanganyika is the world's largest producer of sisal and, together with Kenya, supplies about two-thirds of the world's supply of this fibre. *Fig. 15*

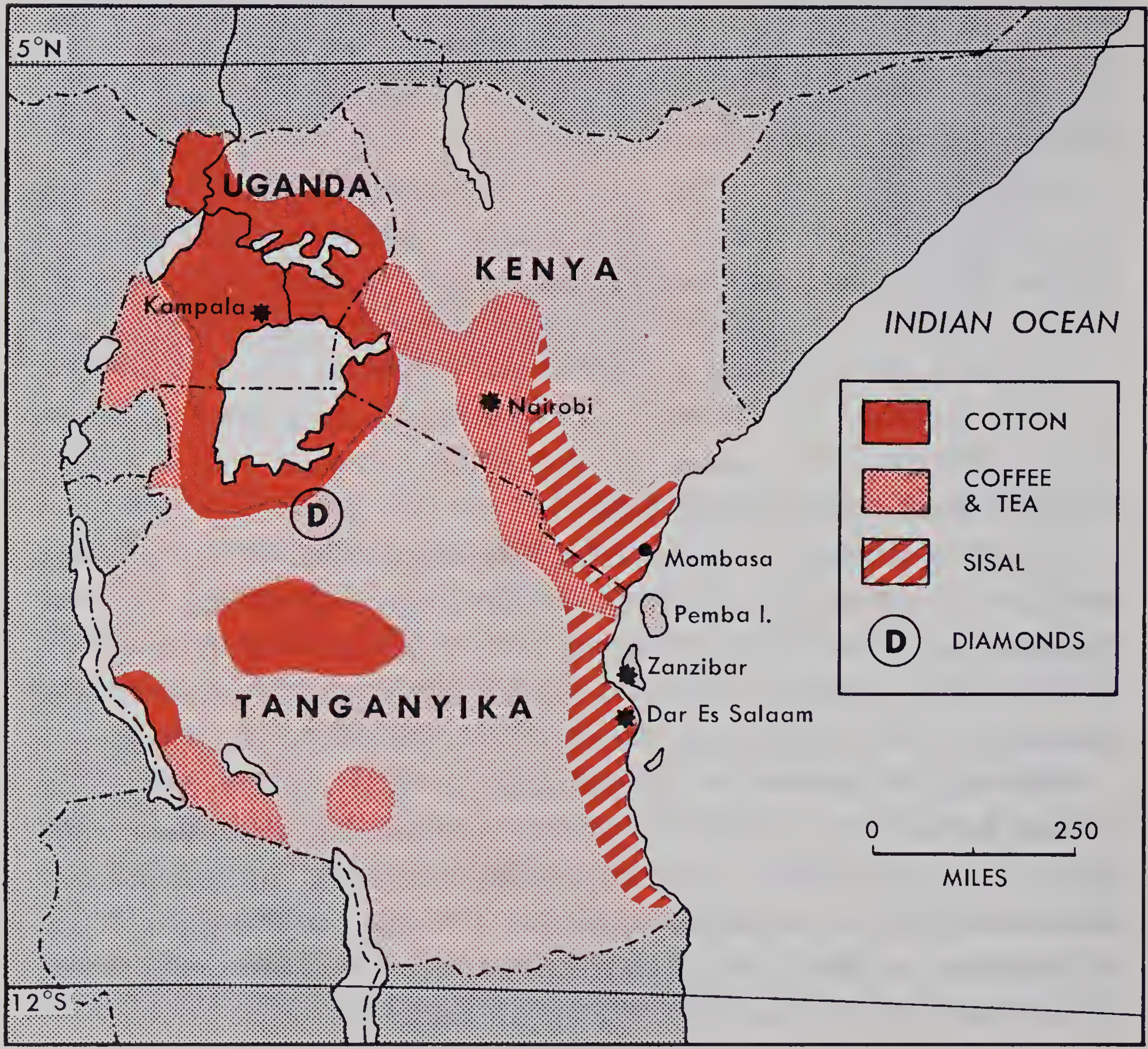
Cotton is an important export of both Uganda and Tanganyika. Tea and tobacco are increasing in importance as plantation crops; and pyrethrum, for making insecticides, is a special crop native to the high East African highlands.

Cloves is a spice obtained from the dried buds of a tree. This product dominates the economy of Zanzibar, accounting for two-thirds of all exports. Zanzibar, in fact, produces about four-fifths of the world's supply of cloves. An oil obtained from the stem of the trees is also exported to be used as a substitute for vanilla. *Fig. 16*

Although the presence of the tsetse fly limits profitable cattle-raising to the drier parts of the plateau, millions of cattle, sheep, and goats are raised, thus providing hides and skins for export and meat and dairy products for local use. The bark of the wattle trees, which grow on the farms of the natives, yields wattle extract which is exported for use in the tanning of leather.

Because coffee, tea, and many plantation crops require several years of care before crops are produced, large amounts of money are needed for their development. In the past, the Europeans were the only group in East Africa with sufficient funds to finance the development of large plantations. The natives could not afford to grow crops that did not produce saleable or usable products the same year in which they were planted. The major exception to this general rule exists in Uganda, where many sugar plantations are owned by Asians. Plantation ownership by Africans, who now provide most of the labour, will probably increase now that the Negro people have political control in East Africa.

Map 14. East Africa: Resources


5°N
UGANDA
KENYA
Kampala
Nairobi
D
INDIAN OCEAN
COTTON
COFFEE & TEA
SISAL
D DIAMONDS
Mombasa
Pemba I.
Zanzibar
Dar Es Salaam
TANGANYIKA
0
250
MILES
12°S

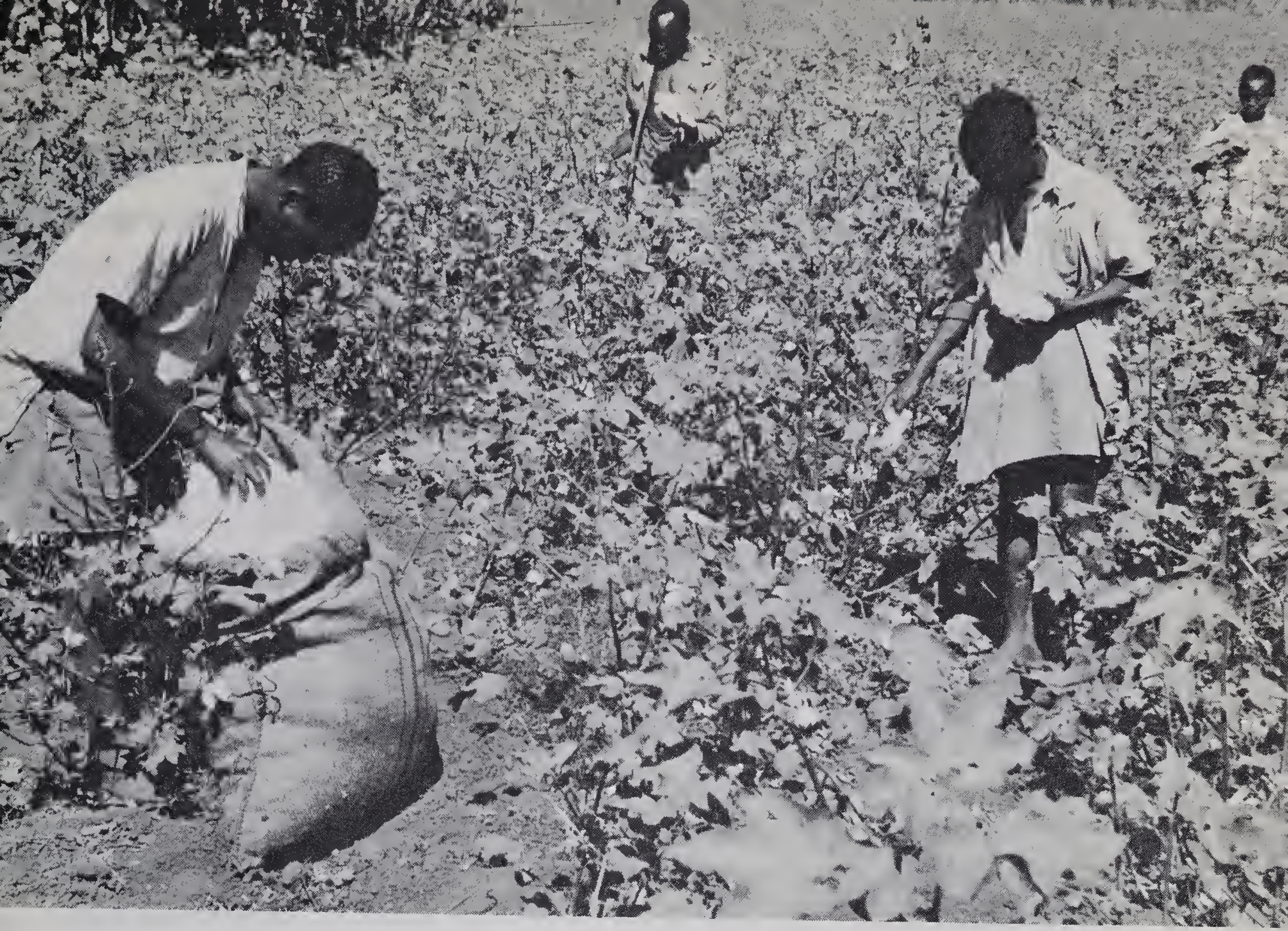


Figure 13. Cotton Picking in Uganda.
Cotton picking is a common sight in Uganda, where cotton is one of the country's most valuable exports. Much of the crop is grown on native-owned farms, which is unusual for a plantation crop. Reliable rainfall in Uganda eliminates the need for irrigation.

The "hoe" and "shifting" cultivation used by most of the native farmers seems inefficient and primitive by Canadian standards, but attempts to apply large-scale mechanized methods in East Africa have not proven successful. The British government spent $100 million trying to grow peanuts in the dry savannas of East Africa but were unsuccessful because the use of heavy machinery packed the tropical soils down so hard that the peanut plants did not grow as well as they did on native farms where hoe cultivation was being used. Several irrigation projects are now being developed with British aid in the drier parts of Tanganyika.

Forestry and Fisheries The forests, which cover only a small percentage of East Africa, provide some wood for fuel and some timber and poles. They are, however, not an important commercial asset. Fishing is carried out on a small scale along the coast and is gaining importance in Lake Victoria, which has been stocked with European species of fish.

Minerals and Power Tanganyika has many large mineral deposits. Diamonds and gold are produced in considerable amounts. A Canadian geologist, Dr. Williamson, discovered and developed *Map 14* one of the world's richest diamond mines in Tanganyika. Copper is a major export of Uganda, which also produces small amounts of tungsten and tin. Mining is not a well-developed industry in Kenya; but the colony includes among its exports a small amount of gold, graphite, and soda ash, which is used in making chemicals.

Little power has been developed in East Africa because of the lack of coal, which is the fuel normally used to generate thermal electricity. Small amounts of thermal electricity are produced in Uganda and Tanganyika by small generators that burn local wood or imported oil. The large hydro-electric power station at Owen Falls, on the Victoria Nile in Uganda, is the only large-scale power development in the region. Its output has made the smelting of copper an important industry in Uganda. A small hydro development in Kenya provides electricity for many of the European homes on the highland. Electricity is not available in the homes of most of the East Africans.

Manufacturing East Africa produces only a small amount of electricity and practically no coal or petroleum; and, without more power, the processing of local raw materials will remain the only industry. The processing plants consist of a few cotton mills, sugar refineries, vegetable oil mills, breweries, flour mills, meat canneries, and cement factories. A huge copper smelter and a large cotton mill operate in Uganda on power from Owen Falls. Otherwise, the factories of East Africa are small in both number and size.

TRADE

The United Kingdom, members of the European Common Market, and the United States are the biggest purchasers of East African goods. The principal suppliers of the machinery, motor vehicles, textiles, and petroleum that must be imported are the

United Kingdom, Japan, and India. Canada conducts very little trade with East African countries.

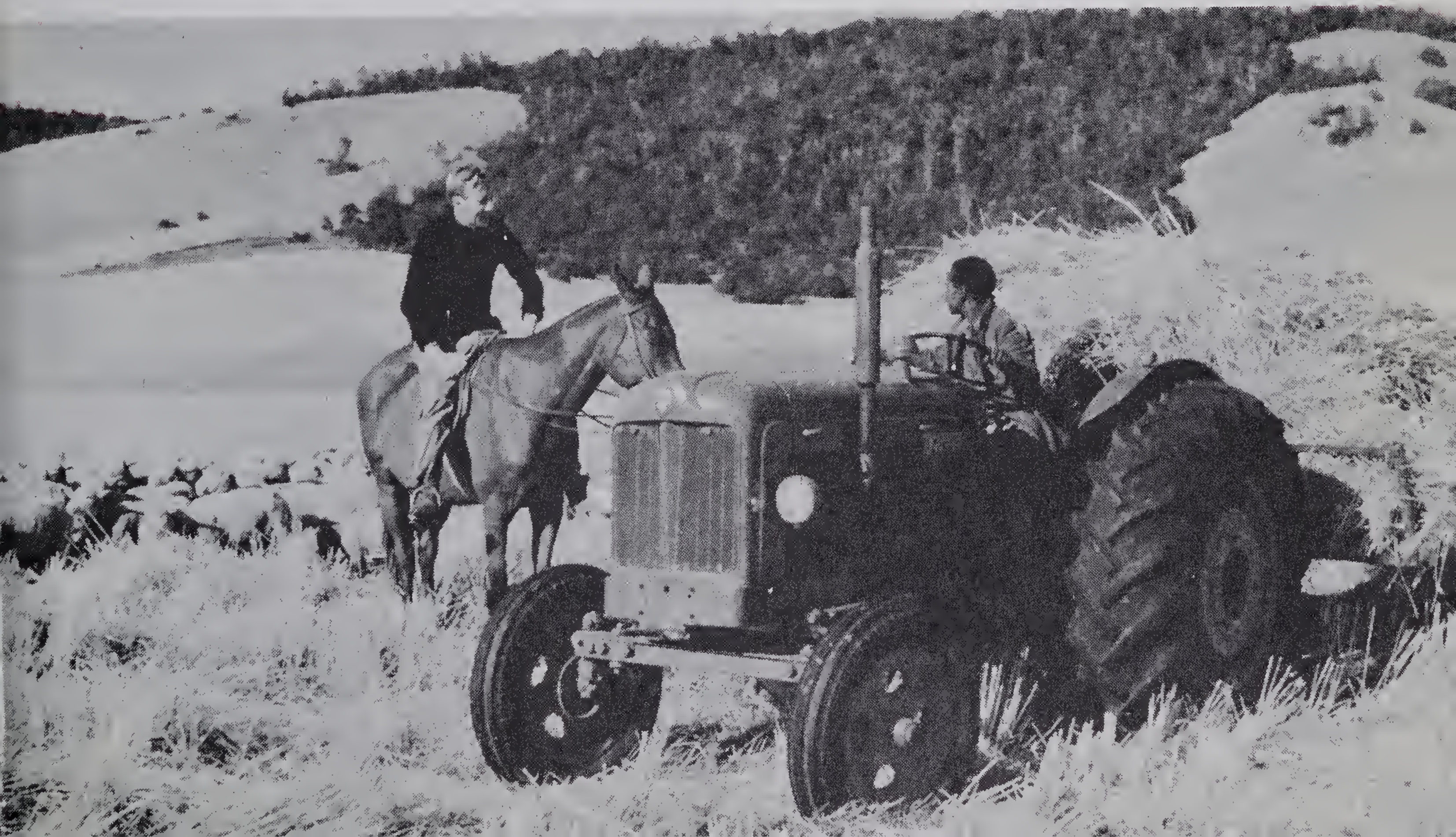
Table of Exports for East Africa

Country	Exports
Kenya	Coffee, tea, sisal, hides and skins, pyrethrum, soda ash, and wattle extract
Uganda	Cotton, coffee, copper, tea, oilseeds, and hides
Tanganyika	Sisal, cotton, coffee, diamonds and other minerals
Zanzibar and Pemba	Cloves and copra

THE PEOPLE

Although Negro Africans make up about 97 per cent of the population of East Africa, white settlers are more numerous in this region than they are in West Africa. The presence of highland

Figure 14. European Farming in the Kenya Highlands.
Agricultural products account for four-fifths of Kenya's exports, consisting mainly of cash crops grown by European farmers employing African labour. Using modern equipment, these farmers have developed the methods and crops best suited to the varied climatic conditions.



areas, with good agricultural land and pleasant temperatures, is the major reason why over 100,000 Europeans have settled in East Africa. These white settlers have developed large, prosperous farms, especially in the Kenya Highlands, on land that was largely unoccupied when they arrived.

Some 300,000 descendants of early Asian settlers also dwell in the region and are the small businessmen and merchants of East Africa. Arabs and Indians are the largest of these Asiatic groups. The Bantu Negroes, who greatly outnumber all other races in the region, are related to the Negro peoples of South Africa and differ in physical appearance from the Sudanese Negroes of West Africa.

Figure 15. Cutting Sisal.
The large, stiff blades of this plant contain long, tough, white fibres that are used to make rope, twine, and backing for carpets. Sisal is an important cash crop in Tanganyika, Uganda, and Kenya and is grown mainly on large plantations.

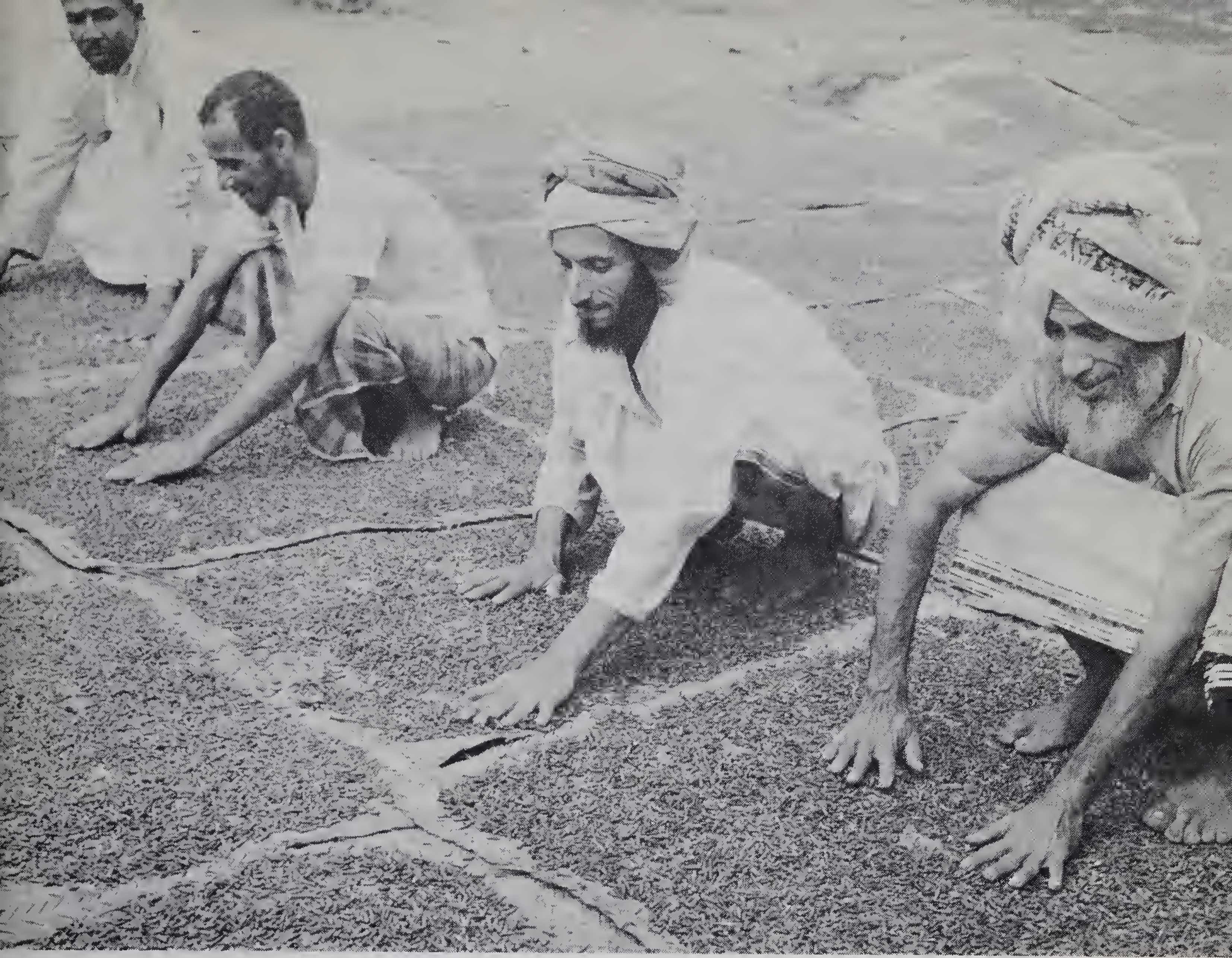


Figure 16. Drying Cloves in Zanzibar.
The buds of the clove trees are picked, separated from the stalks, and laid out in the sun to dry. The men in the picture are turning the cloves to speed the drying process. These men are Yemenite Arabs who sail down from the Gulf of Arabia to take part in the clove harvest.

The varied nature of the surface in East Africa has given the region a very uneven distribution of population. While several large areas are uninhabited, there are other areas, such as the Lake Victoria district, that have dense populations of up to 400 persons per square mile.

Bantus make up the great majority of Tanganyika's population. Most of them are shifting cultivators or cattle herders who live in tribes. Over 81,000 Indians operate stores and work in offices in the cities, and more than 25,000 Arabs are small country traders. Most of the 22,000 Europeans work in offices or stores, run plantations, or are missionaries.

In addition to its African population of about 6½ million, Uganda has 56,000 Asians and 12,000 Europeans. Western influences have brought about great changes for the tribesmen, but many primitive customs remain. Land is still owned tribally rather than individually in most parts of the country. In many tribes, wealth and social position are still determined by the number of cattle owned.

More than 6 million Kenyans are native African tribesmen. The largest tribal group is the Kikuyu tribe, which consists of more than a million Bantu people. There are also 174,000 Asians, 67,000 Europeans, and 38,000 Arabs.

Almost eighty per cent of the population of Zanzibar is African. Since most of the Africans are the descendants of slaves from other parts of East Africa, they are not organized into tribes. The rest
Fig. 16 of the population consists of 47,000 Arabs, 18,000 Indians, and only 500 Europeans.

The majority of the Africans still hold primitive beliefs that are based on ancestor worship. However, Christianity is widespread, and Moslems are numerous along the coast and in some of the older inland cities. Many different religious groups exist among the Asian population. Native dialects are spoken in most areas. Swahili, a Bantu language, is used by many native Africans.

CITIES

There are few large cities in East Africa, and the majority of the people live in rural villages. *Nairobi* (250,000), a modern city on the plateau, is the largest urban centre of the region and the capital of Kenya. *Mombasa* (100,000) is the chief port of Kenya and also ships most of the exports from land-locked Uganda. *Kampala* (70,000) is the main city and native capital of Uganda, and *Entebbe* (8,500) is a transportation centre with a major international airport. *Dar-es-Salaam* (130,000) is the largest city, main port, and capital of Tanganyika. *Zanzibar* (60,000) is the capital of the island Protectorate of the same name.

CONCLUSION

Now that political freedom has been extended to Uganda and Tanganyika, the large Negro majority has gained political control of those countries. How the European and Asian minorities, who control most of the mines and factories and many of the commercial plantations, are treated in the new political setup will be watched with keen interest by all those concerned about the development of Africa. Mistrust and hatred among the different racial groups have caused fighting and bloodshed in Kenya and have resulted in an exodus of white settlers from the region. World interest in the area is focused on the outcome of these racial tensions. Otherwise, the region is significant only as a minor world producer of tropical agricultural products and some minerals.

WORK UNIT 13

The Language of Geography Add to or review in your reference list definitions of the following terms: sisal, pyrethrum, cloves, wattle extract, hoe cultivation.

1. Learn more about the processing and uses of sisal fibres.
2. What part did the Mau Mau terrorists play in the political development of Kenya?
3. Compare farming as practised by the natives with that carried out by the European settlers in East Africa.
4. Why are large parts of East Africa suitable for European settlement?
5. Why is East Africa of special concern to those people watching the development of Africa?
6. Why is the processing of local raw materials the only manufacturing industry of East Africa?
7. Contrast the climate of the coastal lowlands of East Africa with that of the interior highlands and account for the difference.

Maps

On outline maps of the region, mark the significant geographical features mentioned in the text.

THE COMMONWEALTH IN SOUTHERN AFRICA

Southern Africa contains no completely independent members of the Commonwealth of Nations but does contain a former Commonwealth member and several British-controlled countries. The Republic of South Africa was once a full-fledged member of the Commonwealth, but because several other members strongly attacked its policies of racial discrimination against non-whites, South Africa withdrew from the Commonwealth in 1961. Called *apartheid,* the controversial racial policies of the Republic of South Africa will be described later. South-West Africa is a large territory under the control of the Republic of South Africa. Britain controls all of the South African countries still within the Commonwealth. These include the self-governing colony of Southern Rhodesia and the protectorates of Northern Rhodesia, Nyasaland (Malawi), Bechuanaland, Basutoland, and Swaziland.

Commonwealth Countries of Southern Africa

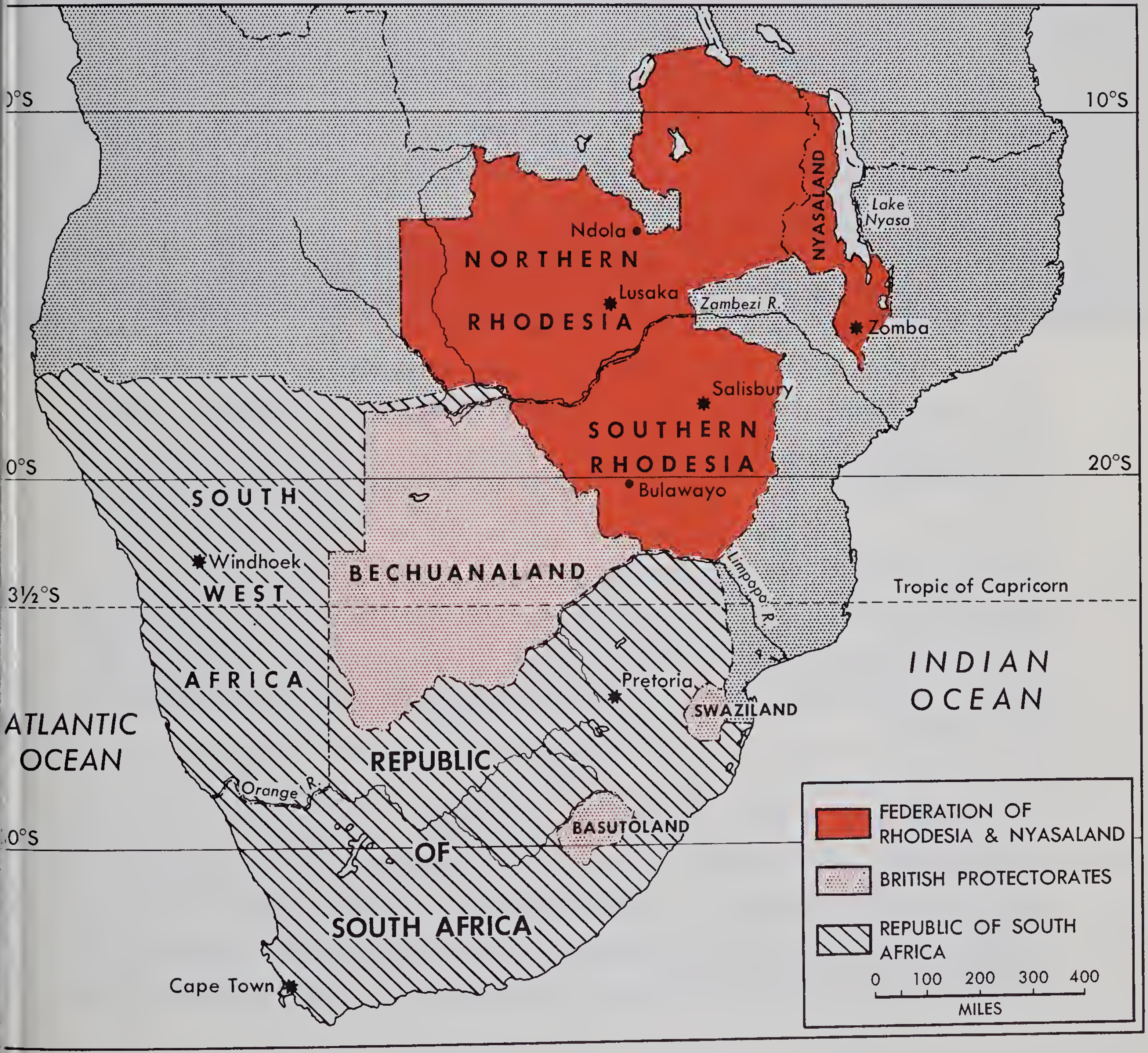
Country or Territory	Area in sq. mi.	Population	Population Density (Persons per sq. mi.)	Capital
Southern Rhodesia	150,000	3,160,000	21	Salisbury
Nyasaland (Malawi)	46,000	2,900,000	63	Zomba
Northern Rhodesia	290,000	2,490,000	8	Lusaka
Basutoland	11,700	685,000	59	Maseru
Bechuanaland	275,000	300,000	1	Gaberones
Swaziland	6,700	275,000	41	Mbabane

The Federation of Rhodesia and Nyasaland

In 1953, the self-governing colony of Southern Rhodesia and the British protectorates of Northern Rhodesia and Nyasaland were combined into the Federation of Rhodesia and Nyasaland. At that time, it was hoped that the new federation would progress in harmony so that eventually it could be admitted into the Commonwealth as an independent dominion. However, a struggle for political control has developed between European minorities, who are particularly strong in Southern Rhodesia, and the African majority.

The population of Nyasaland is almost wholly African, with only a few thousand European and Asian inhabitants. In contrast, Northern Rhodesia has 75,000 European inhabitants; and Southern Rhodesia has more than 220,000 Europeans and several thousand Asians. In Southern Rhodesia, the European minority has political control, but in Northern Rhodesia and Nyasaland the large African majorities control the governments. The bitter struggle between the races has resulted in disturbances and has prompted African leaders in Northern Rhodesia and Nyasaland to agitate for separation from Southern Rhodesia.

Map 15. Southern Africa.


)°S
10°S
Ndola
NORTHERN RHODESIA
Lusaka
NYASALAND
Lake Nyasa
Zambezi R.
Zomba
Salisbury
SOUTHERN RHODESIA
Bulawayo
0°S
20°S
SOUTH WEST AFRICA
Windhoek
BECHUANALAND
Limpopo R.
3½°S
Tropic of Capricorn
INDIAN OCEAN
Pretoria
SWAZILAND
ATLANTIC OCEAN
REPUBLIC OF SOUTH AFRICA
Orange R.
BASUTOLAND
.0°S
Cape Town
FEDERATION OF RHODESIA & NYASALAND
BRITISH PROTECTORATES
REPUBLIC OF SOUTH AFRICA
0 100 200 300 400
MILES

A union of the Rhodesias and Nyasaland makes good sense because in many ways they are interdependent. For example, Southern Rhodesia, which does not have enough workers for her plantations, factories, and mills, could easily obtain workers from Nyasaland, which cannot employ all its citizens. Northern Rhodesia needs the combined populations of the Federation as a market for secondary industry, which could be developed from its mineral wealth. However, in spite of the benefits from remaining in the Federation, the African leaders of Nyasaland and Northern Rhodesia intend to withdraw from it as soon as possible.

LANDFORMS AND DRAINAGE

Map 15 Almost nine-tenths of the Rhodesias and Nyasaland is a rolling plateau between 2,000 and 5,000 feet above sea level. Southern Rhodesia and Nyasaland both have large sections which are over 4,000 feet high. Northern Rhodesia is lower, but in the east, mountains rise to 6,000 feet.

The Zambesi River drains over three-quarters of the region. The river and its tributaries flow slowly in their upper courses where they often include large swamps. Downstream, the Zambezi pours over the edge of the plateau as waterfalls or rapids that boil through deep gorges. Most spectacular of these waterfalls is Victoria Falls, which is over a mile wide and 343 feet high! Two large tributaries of the Zambezi, the Luangwa and Shire Rivers, flow along rifts in the plateau which are southward extensions of the great rift valleys of East Africa. Also occupying a rift is Lake Nyasa, which forms the eastern boundary of Nyasaland. It is 350 miles long and over 2,300 feet deep. Follow the course of these rivers on a map of the region. What river forms the southernmost boundary of Southern Rhodesia?

CLIMATE AND VEGETATION

Although the region lies entirely within the Tropics, the land is so high above sea level that most of the country enjoys a healthy climate. *Map 3* Rainfall seldom exceeds 50 inches a year, and temperatures exceed 90°F. only in the lower river valleys. This

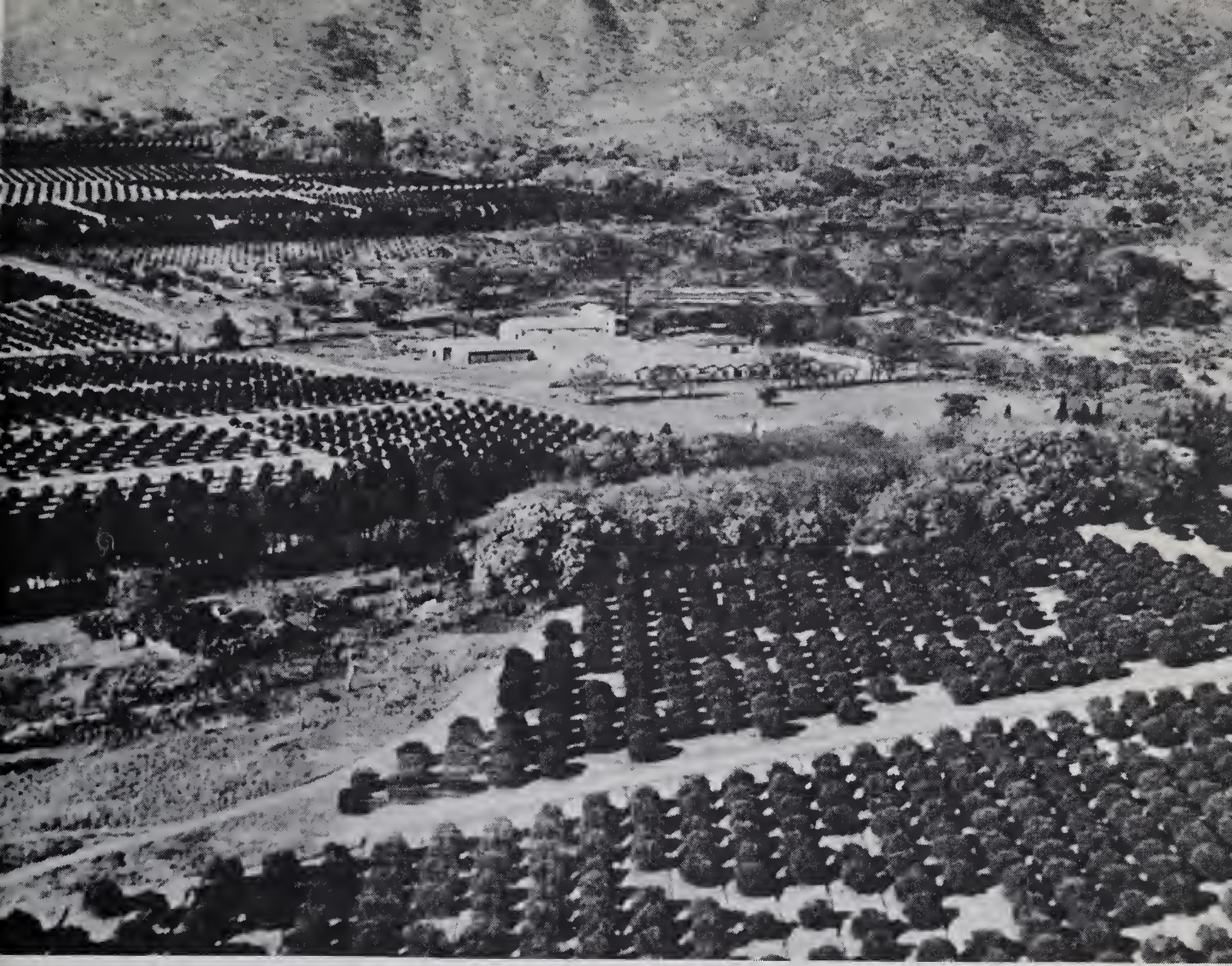


Figure 17. Citrus Fruit Groves in Southern Rhodesia.
These well-organized projects employ negroes but they are owned and managed by Europeans. The growth of the irrigated groves is much more luxuriant than the surrounding natural vegetation. In the background, rounded hills rise above the surface of the plateau.

pleasant climate, together with the presence of fertile soils and rich mineral deposits, has attracted many white settlers. Located on the eastern edge of the plateau where the tableland slopes down to Lake Nyasa, Nyasaland has a hotter climate, poorer soils, and fewer minerals than the Rhodesias. A rainy season occurs from December to March or April. The rest of the year is quite dry. Rainfall increases in amount from southwest to northeast.

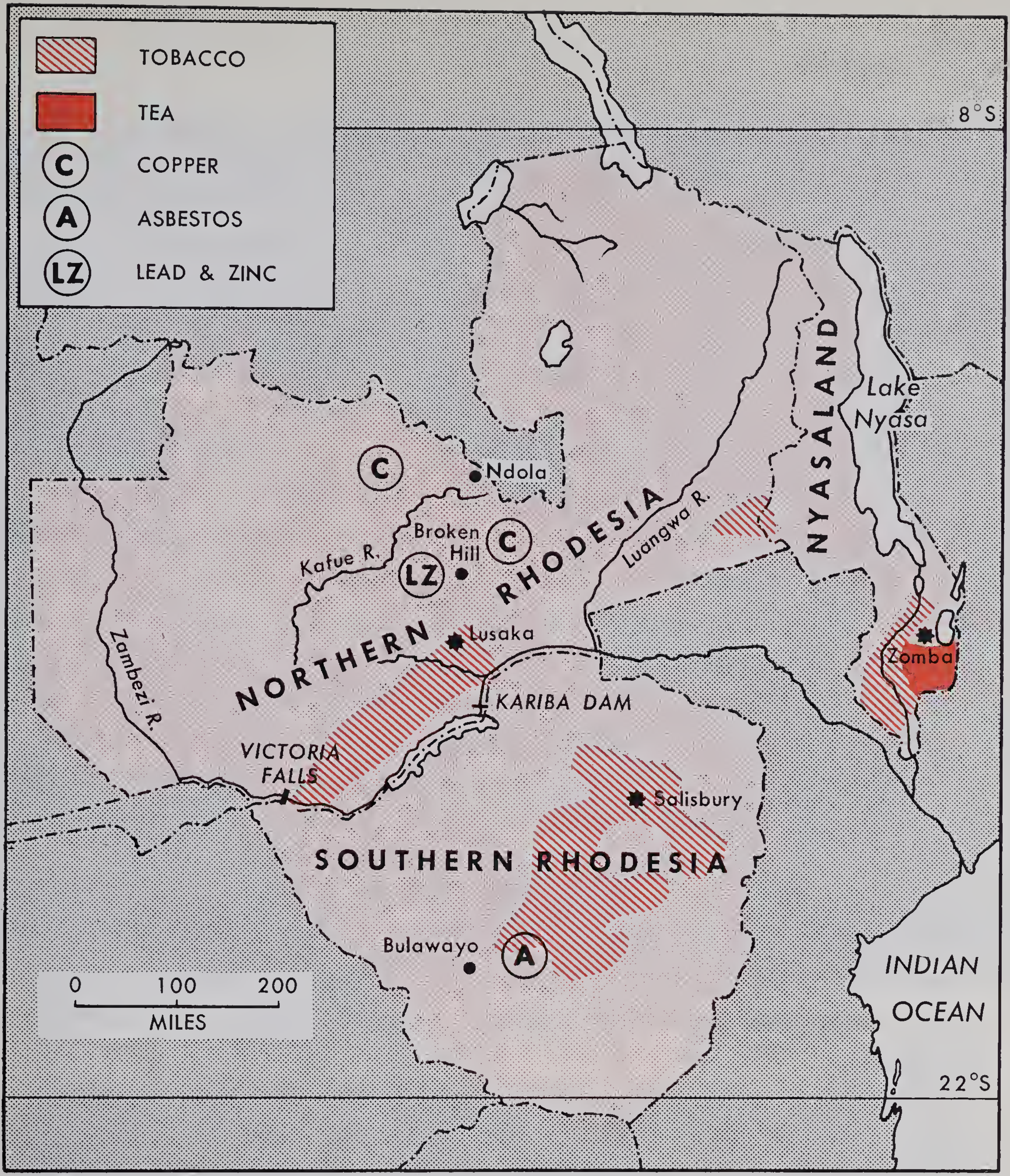
Vegetation Lighter tropical forests cover most of the plateau surface. These savanna grasslands, with scattered trees, are denser in the north than in the south. The baobab tree, described earlier, is typical at lower levels, and the valuable "Rhodesian teak" grows *Map 6* in wetter areas. Flat-topped thorn trees, such as the drought-resistant acacias, are characteristic of the drier areas. Dense rain-forests cover a small fraction of the region, since they grow only in the hot and humid river valleys and lowlands.

RESOURCES AND INDUSTRY

Agriculture The extensive grassland areas of the region normally support about 5 million head of cattle. The ranchers have low costs because the year-round warmth provides continuous pasturage and makes the building of expensive shelter unnecessary. Southern Rhodesia has better pastures and is relatively free of the tsetse fly, so it has more cattle than the northern territories. Both beef and dairy cattle are raised, and pigs are plentiful.

Large, modern, European-owned farms on the fertile grassland produce surplus crops of corn, tobacco, peanuts, cotton, and citrus fruits. European-operated plantations in Nyasaland grow large quantities of tea and smaller amounts of tung nuts for export. The

Figure 18. A Tobacco Farm in Southern Rhodesia.
Southern Rhodesia provides an ideal climate in which to grow tobacco of excellent quality. The plant requires a 90-day growing season and warm, wet weather as well as a well drained and heavily fertilized soil. The flower stem is cut before it matures to concentrate all plant food in the leaves.


TOBACCO
TEA
C COPPER
A ASBESTOS
LZ LEAD & ZINC
8°S
22°S
Lake Nyasa
NYASALAND
NORTHERN RHODESIA
SOUTHERN RHODESIA
Ndola
Broken Hill
Kafue R.
Luangwa R.
Lusaka
Zomba
KARIBA DAM
Zambezi R.
VICTORIA FALLS
Salisbury
Bulawayo
INDIAN OCEAN
0 100 200
MILES

Map 16. The Rhodesias and Nyasaland: Resources.

quantities of tea and smaller amounts of tung nuts for export. The light oil yielded by these nuts is used in making paint. As in the rest of negro Africa, most of the natives depend upon subsistence farming for a livelihood. They rely heavily upon corn, which they grow for food and for animal fodder. Some Africans in Nyasaland have developed their farms to the level where they produce a surplus of cotton and peanuts for export. Once important crops in the area, but now declining in importance, are coffee, sisal, and rubber.

Map 16 Tobacco is the most valuable commercial crop and is the region's second largest export. Most of the tobacco is raised in the eastern section of Southern Rhodesia, but smaller amounts are grown in Nyasaland and Northern Rhodesia. Virginia flue-cured tobacco is the main variety grown, and well over 100 million pounds are exported annually, mainly to the United Kingdom.

Forestry and Fisheries Since the forest industry is, as yet, undeveloped, and the potential value of the woodlands limited, lumber is imported from other lands, including Canada. A fishing industry is developing on Lake Nyasa and appears to have a bright future.

Minerals and Power Minerals represent over 90 per cent of the exports of Northern Rhodesia and 15 per cent of those of Southern Rhodesia. Nyasaland has few mines. Southern Rhodesia ranks third in world asbestos production (after Canada and South Africa) and mines moderate amounts of gold, chrome, copper, beryllium, and coal. In Northern Rhodesia, a copper belt adjoins the mineral-rich Katanga area of the Republic of the Congo. This belt is the
Map 16 third largest copper-producing area in the world (after the United States and Chile) and the largest in the Commonwealth. Over 250,000 persons live in the Copperbelt, including more than 25,000 of European descent. Broken Hill, to the south of the Copperbelt, is the site of a large lead and zinc mine. Cobalt, vanadium, silver, and manganese are other leading minerals mined in Northern Rhodesia.

The region suffers from a fuel and power shortage because it lacks oilfields, and most of the available coal is burned in thermal stations to produce electricity. To overcome the shortage of electricity, hydro-electric power stations are being planned and built on the mighty Zambezi River and its many tributaries. The largest and most publicized of these projects is located at Kariba
Map 16 Gorge, on the Zambezi, 300 miles downstream from Victoria Falls. Now completed, this vast development more than doubles the amount of electricity previously available in the Federation. The Kariba power project generates more electricity than any other power station in Africa. However, the new Aswan High Dam project in Egypt will have a larger output when it is completed.

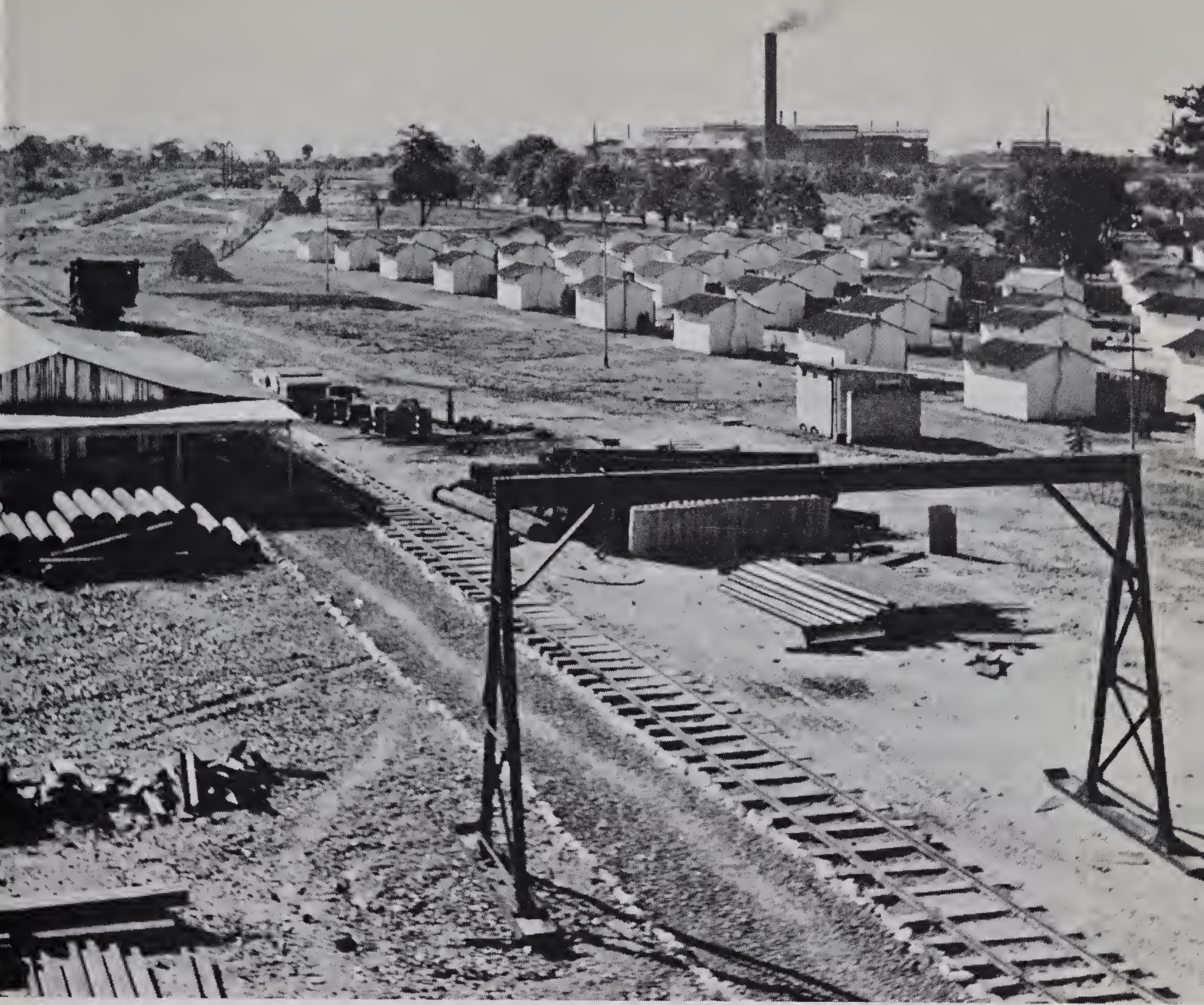


Figure 19. A Copper Mining Centre in Northern Rhodesia.
The small, white houses provide dwellings for the negro miners. The railway line, like many other railways in Africa, was built specifically to carry minerals. Copper is one of the major commodities mined in Northern Rhodesia and, together with mines in the Congo, the output of the area ranks third in world production of this useful mineral.

Manufacturing The present industries of the region process goods for export and supply goods for local use. The processing of the nation's main export products in metal refineries and tobacco factories represents the major part of the manufacturing industry. The remainder consists largely of plants which provide processed foods, beverages, clothing, furniture, building materials, and engineering supplies for the domestic market. Since 1957, motor vehicle assembly and the manufacture of vehicle accessories, such as tires and batteries, have become important. The abundance of minerals and the availability of good power sites give the area a promising future as a manufacturing region.

Cities *Salisbury,* in Southern Rhodesia, is the federal capital and the centre of the tobacco industry. Rapidly gaining importance as a manufacturing centre, the city has a population of over 280,000. The second largest city of the Federation, *Bulawayo* (160,000), is also in Southern Rhodesia. In both of these centres, one-third of the citizens are European in origin. Other important cities are *Lusaka* (80,000), the capital of Northern Rhodesia; and the Copperbelt mining centres of *Ndola* (70,000), *Kitwe* (90,000), *Luanshya* (70,000), *Mufulira* (55,000), and *Broken Hill* (45,000). Nyasaland is almost entirely rural and has few cities. *Blantyre,* the largest centre, has 58,000 inhabitants; and *Zomba,* the capital, has only 8,000 citizens.

Table of Foreign Trade for the Federation of Rhodesia and Nyasaland

	Chief Exports	Chief Imports
Items of Trade	Copper, tobacco, asbestos, chrome, tea, corn.	Machinery and vehicles, textiles, foodstuffs, oils.
Trading Partners	United Kingdom United States Union of South Africa Republic of South Africa	United Kingdom Republic of South Africa United States Canada

Conclusion This region displays the contrasts and changes so characteristic of modern Africa. The native people are asking for the freedom that has been extended to native Africans in many other parts of the continent. At the present time, the European settlers still have more power than their numbers justify; but it is apparent that the native Africans, who greatly outnumber the white settlers, will insist on having a larger say in government. The Federation has sufficient natural resources to become one of the leading economic regions of the continent. What effect the coming changes in political control will have upon the development of these rich resources is difficult to foresee.

The Republic of South Africa

This country was called the Union of South Africa until 1960, when it became the Republic of South Africa. A year later the Republic withdrew from the Commonwealth. South Africa, 472,000 square miles in area, is larger than Ontario but smaller than Quebec.

Large groups of several different races live in the Republic of South Africa. Of the 15,800,000 people in that nation, 10,800,000 are Bantus (native negroes), 3,000,000 are people of European descent, 1,490,000 are "coloured" (a local term used to refer to people who have mixed negro and European blood), and 480,000 are Asian (mostly Indians and Malays). The whites consist of two main groups, (1) the descendants of British colonists, and (2) the Boers or Afrikaners, who are the descendants of early Dutch colonists. Since the Boers outnumber the British by 3 to 2, and the vote of the white population determines which men are to govern the country, the Boers hold effective political control of the nation.

The government of this white-dominated nation has attracted world-wide attention because of rather repressive methods it has used to ensure the continued supremacy of its white citizens over the large negro majority. Herein lies the major problem of the Republic. The three million whites wish to maintain control of the country, despite the fact that they represent only one-fifth of the population. The right to vote in the election of almost all members of parliament is restricited to whites. Only a handful of members represent the "coloured" group, and the large Bantu majority have no representatives in South Africa's parliament. This restricted system of voting allows the white settlers to maintain political control of the other racial groups.

It is not, however, the undemocratic representation in parliament that is causing the most serious racial disturbances in South Africa

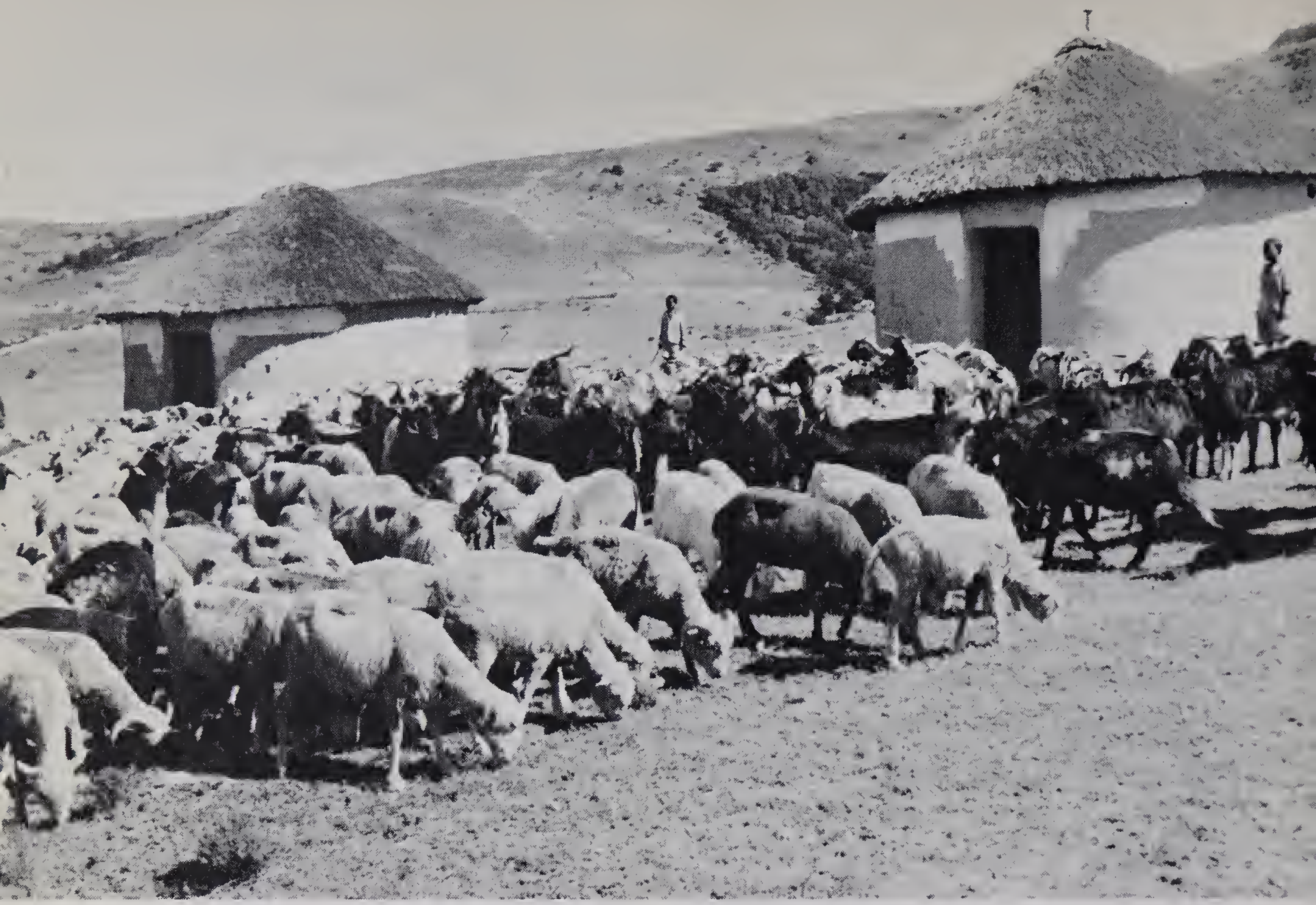


Figure 20. Livestock on a Native Reserve.
These small, round huts with thatched roofs and no windows are typical of native homes. Close cropping of the grass by small stock, such as these sheep and goats, causes much soil erosion in this area.

but a strict policy of racial segregation, called *apartheid*, that is enforced by the South African government. In the Afrikaans language of the Boers, apartheid means "apart-hood" or apartness. The policy involves an attempt to keep the three main racial groups — whites, negroes, and the coloured-Asian group — as separate as possible, with the whites in a superior position. As a result of the policy, South Africa is the most segregated country in the world. Everyone in the nation is classified by government officials according to race. A South African citizen's way of life is determined by the classification which he receives. If he has negro ancestors, then he must (1) live in an area where only negroes are allowed to live, (2) carry a pass if he wishes to enter a city, (3) work only at government-approved, unskilled jobs, (4) use buses, railway coaches, taxis, hotels, restaurants, movies, hospitals, elevators, beaches, water fountains, and park benches that are designated for non-white use, (5) send his children to separate native schools, and (6) mix socially and marry only within his own racial group. The same type of restrictions also apply to the whites and to the coloured-Asian group.

The English-speaking citizens control much of the economic life of the nation, operating most of the factories, mines, and financial institutions. Most of the Afrikaners are farmers. The Asians, most of whom are Indians whose ancestors came from India to work on sugar plantations, are concentrated largely in Natal. Many still work on the plantations, but a large number have become merchants in the towns and cities. About one-third of the Bantus are employed in South Africa's many mines, another one-third work on white-owned farms, and most of the others grow crops or raise livestock on the tribal reservations.

In many ways, life on the tribal reservations is the same as it has been for the Bantu tribesmen for thousands of years. Except in some areas where the government has built new homes to help to keep the natives away from the cities, the Bantus still live in round huts made *Fig. 20* of stone or mud thatched with grass. They still raise sheep, goats, and cattle and grow millet. However, in several other ways, life has changed much since the arrival of the Europeans. Big game, which the natives used to hunt to increase their food supply, is no longer plentiful. The sales of animal products and crop surpluses, when available, seldom provide the people with sufficient money to buy the things they need. The Bantu have allowed their sheep and goats to eat the protective grass cover from much reservation pasture, thus exposing it to severe soil erosion. Lack of proper soil management by uneducated native farmers has exhausted their soils, resulting in smaller crops. Under these conditions, the Bantu, who are steadily increasing in numbers, cannot make a decent living on the crowded reservations.

The meagre living standards offered by life on the native reservations prompt many men to leave their families in order to seek work in European-owned farms and mines. Wages, by our standards, are low; but they are considered good in view of the low economic standards which exist in the native settlements.

Conclusion Despite its racial problems, the Republic of South Africa is the most prosperous and best developed country in Africa. It has more factories, more transportation facilities, and more trade than all of the other countries of the continent combined. If a solution can be found to the complex race problem, the country can look forward to a future of prosperity and increased world importance.

South-West Africa

The Republic of South Africa considers South-West Africa as part of the Republic. However, many other countries feel that the former German colony, which was put under the supervision of South Africa after the German defeat in World War I, should be regarded as a United Nations Trust Territory under the temporary administration of the Republic.

About 73,000 Europeans, of whom most are Afrikaners from the Republic, live in the territory. They have gained control of much of the best agricultural land and operate most of the mining developments. The white settlers are represented in the national parliament of the Republic of South Africa.

The British Native Territories

The United Kingdom controls the three native territories of Bechuanaland, Basutoland, and Swaziland through a High Commissioner and local resident commissioners but allows the native chiefs to help govern in their own tribal areas. In general, the territories are inhabited by people of the Bantu race, and the land and resources have not been developed. Dirt roads still form the principal transportation routes, and most of the inhabitants are dependent upon primitive agriculture for a living. The lack of development is well illustrated by the absence of large towns and cities.

Three-quarters of *Bechuanaland* lies within the Kalahari Desert, and large areas in the north are occupied by swamps. Most of the 300,000 inhabitants live in the southeastern section of the country, where rainfall is sufficient to provide pasture. Cattle raising is the only important occupation; hides from this industry are sometimes exchanged for goods from the Republic of South Africa. *Fig. 3*

Basutoland is located in the Drakensberg Mountains and is completely surrounded by the Republic of South Africa. The native Basuto grow crops in the fertile valleys and raise sheep, goats, and cattle on the good pasture of the mountain slopes. Wool is the main export. Some corn and sorghum are grown for local use.

The economy of the colony is partially dependent upon money sent home by the 150,000 Basuto who are employed in mines and on farms in the Republic of South Africa. Principal imports are blankets, clothing, and ploughs; wool and mohair are the only significant exports.

Swaziland is almost enclosed by the Republic of South Africa but borders *Mozambique* in the northeast. Western Swaziland is mountainous; but the eastern part is a fertile agricultural area, producing corn, cotton, tobacco, rice, and citrus fruits. Like Basutoland, Swaziland has large numbers of cattle and goats. A considerable volume of trade flows between the territory and the Republic of South Africa; cotton seed, butter, cattle, rice, and citrus fruits are all exported. However, the main export is asbestos, of which Swaziland is the fifth largest producer.

The native territories would probably become more prosperous as part of the Republic of South Africa, but the negro inhabitants refuse to be absorbed into the Republic because of its unpopular apartheid rules. The British have allowed the people of the three Territories much racial freedom and have promised not to turn the territories over to the Republic without their consent.

PROBLEMS OF AFRICA

Pests and diseases constitute a greater threat to the people, animals, and crops of Africa than they do in Canada. Insects, many of which carry harmful bacteria, thrive in the tropical parts of the continent. Mosquitoes carry yellow fever and malaria, both of which can be fatal to humans, as well as other fever germs and a disease called elephantiasis (a swelling of the legs). However, the threat has been reduced in recent times by the oiling of ponds to kill the mosquito larvae and by the use of quinine and atebrin drugs.

Among the most harmful of the continent's insects are the tsetse flies which transmit sleeping-sickness to humans and nagana disease to animals. Before modern drugs were introduced, millions of people and animals perished from the effects of these diseases. The yearly cost of innoculating domestic animals against nagana makes the keeping of commercial herds unprofitable in zones infested by the tsetse flies.

Having to go without shoes, many Africans are exposed to the danger of hookworms, which enter their bodies as larvae through the feet. Making their home in the stomach of their victims, these parasites sap the strength of the body and cause anaemia (a reduction in the number of red corpuscles in the blood).

Additional carriers of disease are the rats, lice, ticks, and fleas that infest many parts of Africa. The threat of typhus and other plague diseases posed by these pests and insects is now being fought by attempts to clean up the villages, eliminate the rats, and kill the lice and fleas with DDT. The cleaning up of unsanitary conditions, now so common in the primitive parts of Africa, will also help to overcome the dysentry, diarrhea, and parasitic worms that currently weaken and kill many African natives.

Other diseases found throughout Africa are tuberculosis, smallpox, polio, influenza, yaws (which leaves great ulcers on the skin), and leprosy (which eats away parts of the body). Until more doctors and hospitals are made available to the African people, diseases will continue to remain an everyday threat to African life.

Pests and diseases also constitute a severe threat to the crops and farm animals. Great swarms of locusts that destroy all vegetation in their path have long been the enemy of African farmers. Blown by the wind from place to place, some swarms cover areas of over 1,000 square miles. The spraying of crops with insecticides is now reducing the size of the locust swarms.

Fig. 21

Although diseases still cause much suffering and death in Africa, the medical and hygienic work that has been undertaken on the continent in recent years has saved millions from the ravages of disease and has added to the life expectancy of the population. The population is growing so rapidly that it is surpassing the continent's present ability to supply food. To solve this problem, the authorities must either take steps to control the increase of population or increase the food supply by introducing new types of crops, applying more efficient methods of farming to the present crops, making stronger efforts to conserve the fertility of the farmlands, and finding more productive uses for jungle lands. A related problem is the control of water. In the huge sections of Africa that suffer from scanty and unreliable rainfall, there is a great need for wells, storage dams, and irrigation systems; in the wetter parts of the continent, the need is for flood control and drainage schemes. The lack of money and skilled technicians to carry out these projects is a major problem in Africa.

The lack of capital and technical skills is also reflected in the scarcity of manufacturing plants and efficient means of transportation and communications. Africa has very little manufacturing capacity, considering its huge area and population. Many of the

Figure 21. A Swarm of Locusts.
In a very short time a swarm of locusts — an insect like a large grasshopper — can strip every bit of green foliage from a vast area. Crops are completely devastated, causing poverty and famine. Modern methods of control are now decreasing the size of such hordes.

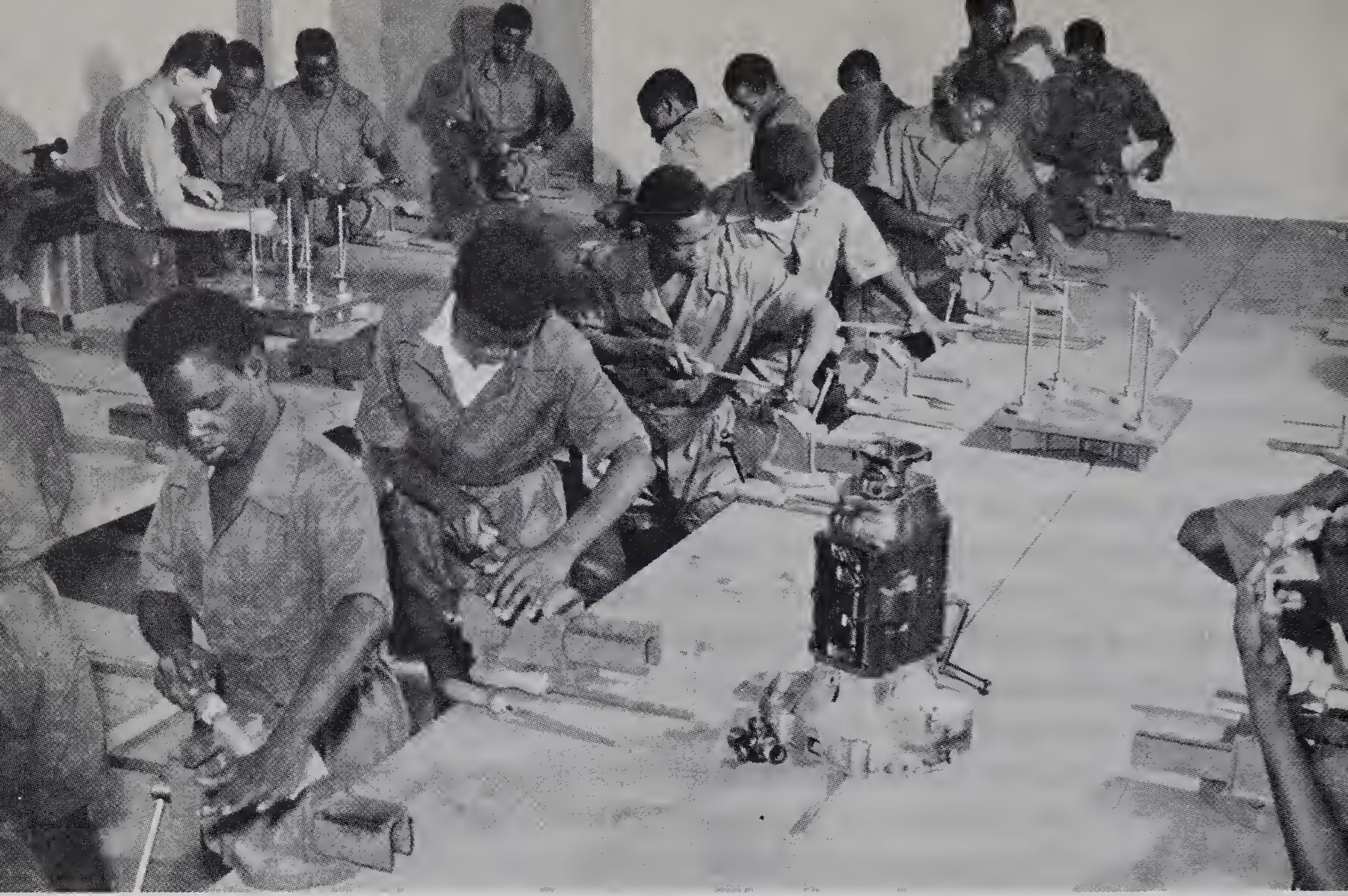


Figure 22. A Technical Training School.
The lack of an adequately trained labour force is one of the reasons for Africa's slow growth. If the continent is to continue its development, her native peoples will have to acquire technical knowledge and new skills to meet the demands of an expanding industry. Many more schools like the one in the picture are required to provide this training.

factors necessary for the development of a prosperous, modern manufacturing industry are missing. Most regions of Africa lack coal and petroleum resources for the development of power. The large amounts of money necessary to harness the many excellent hydro-electric power sites on African rivers and to build and equip modern manufacturing plants are not available. The generally poor and uneducated inhabitants of most of the continent are unable to pay for the manufactured articles that such plants would produce, so there is little incentive for foreign investors to provide capital to develop industry. Even if these other factors were present, and factories could be built, the problem of staff to operate them efficiently would still exist. Engineers, trained technicians, educated office workers, and skilled tradesmen are scarce in Africa, and it will take many years of concentrated effort to bring the level of education up to the point where any significant amount of manufacturing can be carried on. *Fig. 22*

The general poverty and lack of education among much of the native population represents the greatest problem. More mines and farmlands must be developed, and more schools, hospitals, and factories built, before the average African can begin to enjoy the benefits long available to the average Canadian.

CONCLUSION

In many ways, Africa is a rapidly changing land. Several nations have recently become independent; and many others are rapidly approaching the time when they will be given complete freedom from colonial control. All this is in contrast to the situation before 1950, when Africa was a largely colonial continent with very few independent nations.

Accompanying the political transition are economic and social changes. Native Africans are gradually abandoning their tribal societies and are adopting the European and North American patterns of living. The gradual spread of education and non-pagan religion is introducing to the great masses of Africans new and revolutionary ideas which will allow them to throw off their former primitive ways and enter a new era of modern living. Another encouraging sign of progress is the growing number of native African farmers who have joined the white farmers as producers of plantation crops for export. Their new interest in the trade and economics of their homelands will make them better able to understand the problems of government that will face the new independent nations of Africa.

WORK UNIT —

The Language of Geography Add to your reference list, definitions of the following terms: federation, land-locked, ocean terminus, asbestos, beryllium, vanadium, cobalt, elephantiasis, nagana, anaemia, yaws, leprosy, insecticides, locust.

Problems and Projects

1. Using reference sources, prepare a report about the nature and value of the Kariba Power Project.
2. What changes have occurred in the political status of the countries in this region since 1950?
3. What conditions in Southern Rhodesia make the growing of tobacco profitable?
4. What has been the effect of geography upon the history of this region?
5. Why are the Europeans who now control the Rhodesias finding it difficult to maintain their leadership?
6. What cities in your province are larger than Salisbury? What cities in Canada have grown for the same reason as Ndola?
7. In the Republic of South Africa, what are some of the restrictions imposed under the policy of apartheid?
8. Prepare a table to compare Canada and the Federation of Rhodesia and Nyasaland under the headings: (a) area, (b) population, (c) languages spoken, (d) main racial groups, (e) exports.
9. Why do the relatively poor British native territories not want to join the prosperous Republic of South Africa?
10. Suggest some of the most important requirements to solve the problems facing the peoples of Africa.

Maps

On an outline map of Southern Africa, mark (a) the political divisions, (b) principal cities, (c) important rivers, and (d) outstanding landforms.

REVIEW QUIZ—AFRICA

Copy the statements below, filling in the blanks with an appropriate word or phrase.

1. The independent British Commonwealth members in Africa are: (1) Ghana, (2) ...., (3) ...., (4) ...., (5) ....
2. The highest per-capita income among the British Commonwealth members in Africa is found in ....; the lowest in ....
3. Two important rivers of Nigeria are the .... and ....; the most important river in Ghana is the ....
4. The wettest section of the West African coast is in ....; the driest section is in ....
5. .... has the best network of railways in West Africa.

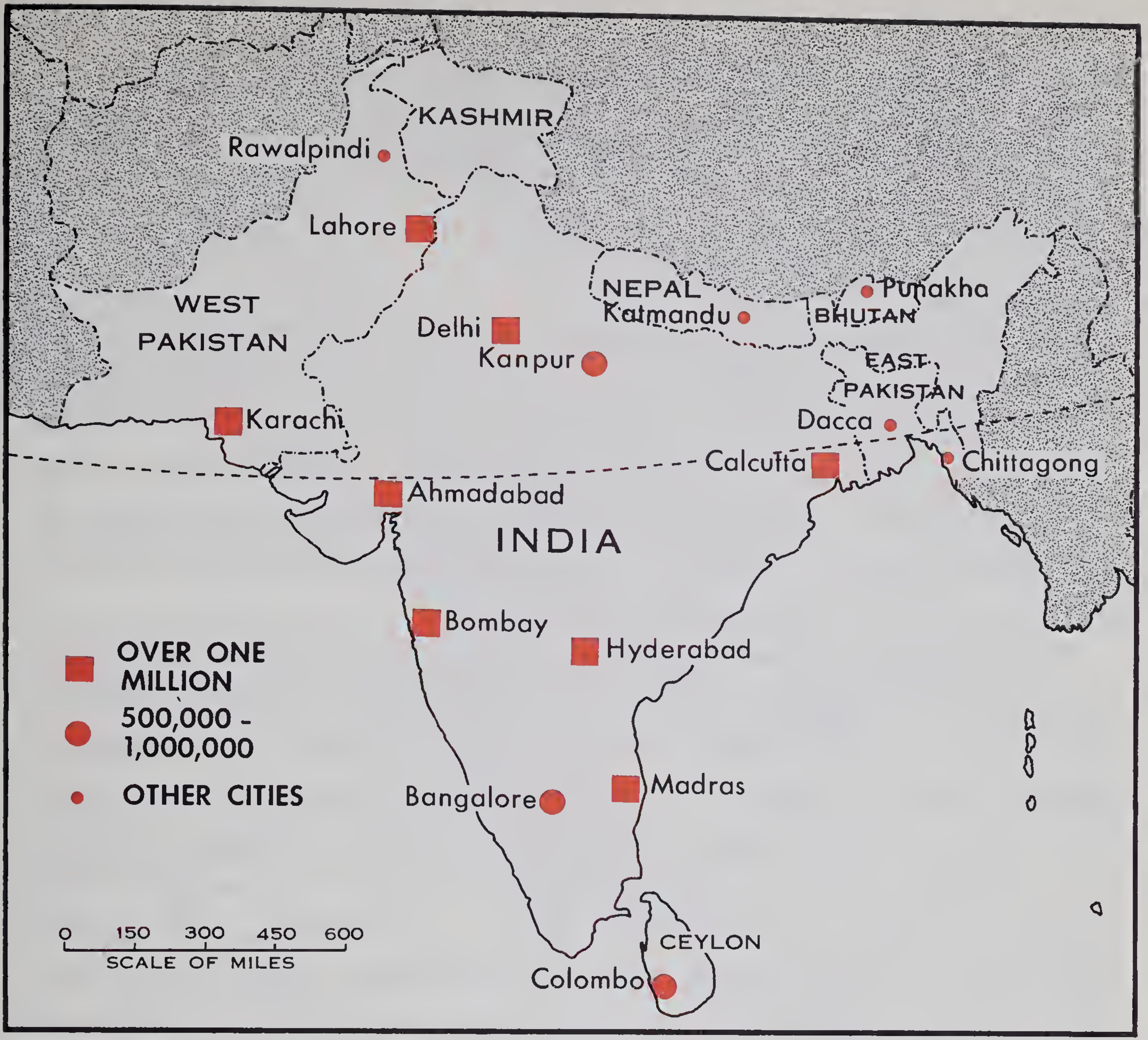
6. The best customers for West African goods are .... and ....
7. Canada buys .... and .... from West African Commonwealth members, and less than .... per cent of Canada's total trade is with these members.
8. White settlers were discouraged from West Africa because ....
9. West Africa's density of population is about .... times that of Canada.
10. Nigeria's largest city is ....; the largest city in Ghana is ....
11. The largest Commonwealth member in East Africa is ....
12. Three large lakes, Lake ...., ..., and ...., occupy sections of the rift valleys of East Africa.
13. Cotton is a major export of ....
14. Kenya's major export is ....
15. The largest coffee producer in the Commonwealth is .... ; the largest sisal producer is ....
16. Diamonds are an important mineral export of ....
17. The three greatest importers of East African products are ...., ..., and ....
18. About .... per cent of East Africa's people are Arabs, Indians, or Europeans.
19. The largest city in East Africa is ....
20. A former Commonwealth member in Southern Africa is the Republic of ....
21. Two important mineral exports of the Republic of South Africa are .... and ....
22. Victoria Falls, which is on the .... River, is .... feet high.
23. White settlers are attracted to the Rhodesias because ....
24. Large numbers of cattle are raised in Southern Rhodesia because ....
25. The world's largest producers of asbestos are Canada, South Africa, and ....
26. The largest copper producer in the Commonwealth is ....
27. Negroes outnumber the white people of the Republic of South Africa by about .... to one.
28. South Africa's race separation policy is called ....
29. Two British colonies surrounded by the Republic of South Africa are .... and ....
30. Two of the great problems facing the people and governments of Southern Africa are .... and ....

The Commonwealth in South Asia: The Indian Subcontinent

Three important members of the Commonwealth — India, Pakistan, and Ceylon — are located in South Asia. They occupy the greater part of a large land mass that projects southward into the Indian Ocean. Known as the Indian Subcontinent, this large land mass is located between 6°N and 37°N latitude. It is called a "subcontinent" because of its large area and because the extremely high mountains along its landward margins cut it off from the rest of Asia. *Map 1*

The combined population of these three Commonwealth countries is over a half billion persons and represents about *one-sixth* of the world's total population. The great majority of these people live in India with its huge population of more than 436 million and in Pakistan with its 94 million inhabitants. Only China has more people than India, and Pakistan's population is also among the largest in the world. Ceylon has a comparatively small population of slightly less than 10 million.

The Indian Subcontinent has a total land area of about one and three-quarter million square miles, made up of 1,260,000 square miles in India, 364,800 square miles in Pakistan, and 25,300 square miles in Ceylon. Thus India is roughly the size of Canada's Northwest Territories; Pakistan has about the same area as British Columbia; and Ceylon is about one-tenth of the size of Alberta.


KASHMIR
Rawalpindi
Lahore
WEST PAKISTAN
Delhi
Kanpur
NEPAL
Katmandu
Punakha
BHUTAN
EAST PAKISTAN
Dacca
Karachi
Calcutta
Chittagong
Ahmadabad
INDIA
Bombay
Hyderabad
OVER ONE MILLION
500,000 - 1,000,000
OTHER CITIES
Bangalore
Madras
0 150 300 450 600
SCALE OF MILES
CEYLON
Colombo

Map 1. Political Areas and Cities.

Maximum east-west and north-south distances across the subcontinent both measure approximately 2,000 miles, which is about the distance between Edmonton and Toronto. The island of Ceylon has a north-south length of 272 miles and an east-west maximum width of 140 miles.

The greater part of the subcontinent was once the British Indian Empire. In August of 1947, however, Britain granted political independence to the last of its territories in South Asia. At that time Ceylon became an independent country, and the mainland area was divided, on a religious basis, into the independent countries of India and Pakistan. Those areas that had a Hindu majority were included in India, and those with a Moslem majority were included in Pakistan. This basis for division caused many problems and created a political oddity in that Pakistan consists of two distinct parts separated by more than 1,000 miles of Indian territory.

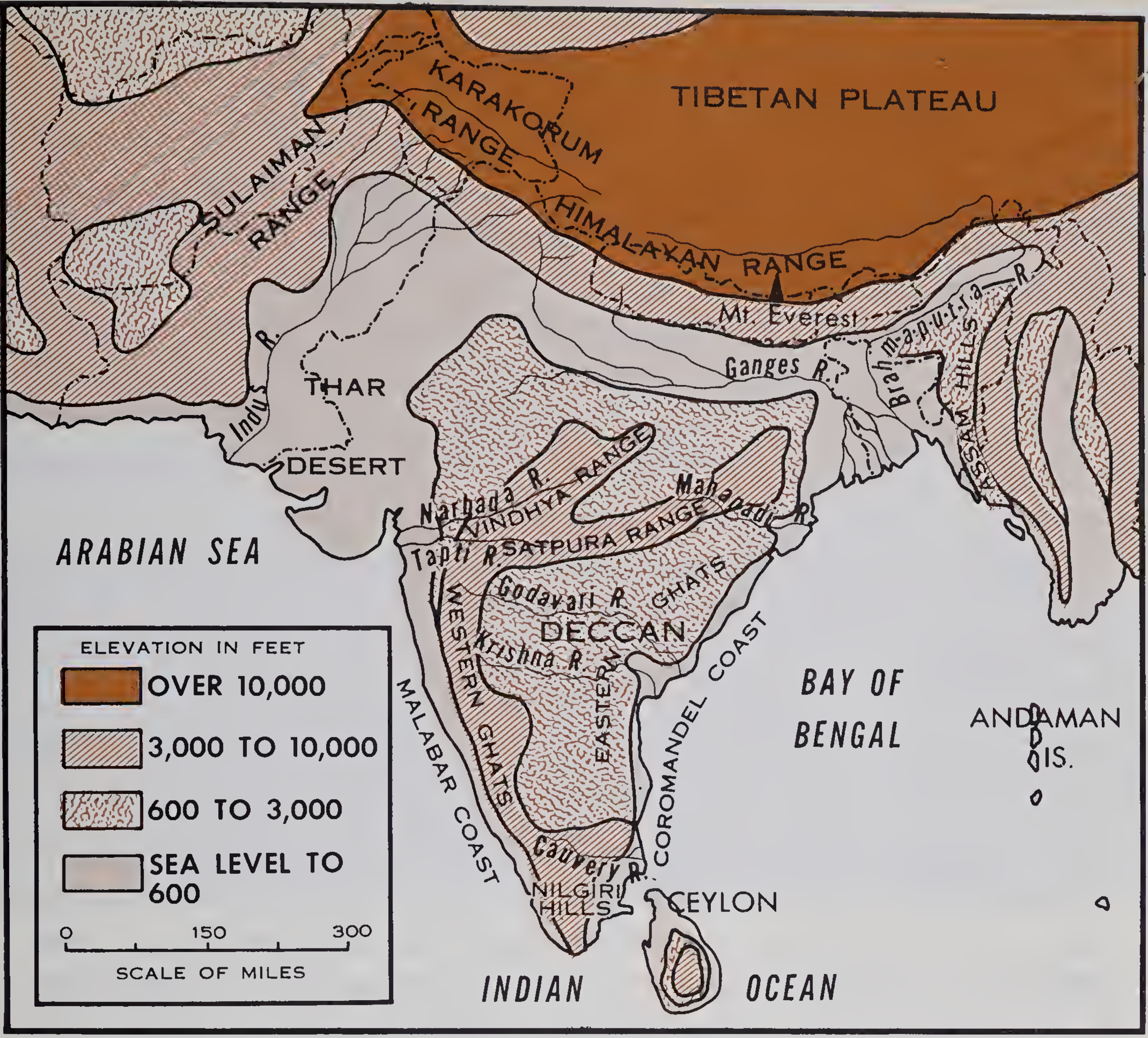
LANDFORMS

The subcontinent can be divided into five landform regions: (1) a series of mountain systems in the north, (2) a large lowland, called the Indo-Gangetic Lowland, that stretches across the northern part of the mainland, (3) the Deccan, a huge, ancient plateau lying south of the plain, (4) generally narrow coastal plains that separate the ancient plateau from the bordering seas on both the east and the west, and (5) the island of Ceylon.

The Mountains of the North Several towering mountain ranges radiate from a high point called the Pamir Knot in the northwestern corner of the subcontinent. The greatest of these is the Himalaya
p. 368 Range which has many of the highest peaks in the world, including Mt. Everest (29,028 feet), the world's highest mountain. Everest is not in India, but on the border between the two neighbouring countries of Nepal and Tibet, which is a part of China. The rugged
Map 2 Himalayan Range extends along the northern edge of the subcontinent from Kashmir in the northwest to the Assam Province of India in the Northeast. To the north of the Himalayas, The Karakoram Range in Kashmir reaches a maximum elevation of 28,250 feet at Mt. Godwin Austen. These towering mountain ranges, together with others in neighbouring countries, serve as an effective barrier between South Asia and the rest of Asia. Because of this great isolating wall, the climate and way of life of the subcontinent differ from those of neighbouring lands.

The peaks of the Sulaiman Range in northwestern Pakistan are less than half as high as those of the Himalaya or Karakoram Ranges. Nevertheless, they still create a formidable barrier to travel between Pakistan and Afghanistan. Another barrier exists in the northeast, where mountains and hills along the India-Burma border hinder land communications between South and Southeast Asia.

The Indo-Gangetic Lowland South of the high mountain region is a great lowland that stretches for 2,000 miles across the wide northern portion of the mainland. It is known as the Indo-Gangetic


TIBETAN PLATEAU
KARAKORUM RANGE
HIMALAYAN RANGE
Mt. Everest
SULAIMAN RANGE
Indus R.
THAR DESERT
Ganges R.
Brahmaputra R.
ASSAM HILLS
Narbada R.
VINDHYA RANGE
SATPURA RANGE
Mahanadi R.
Tapti R.
Godavari R.
EASTERN GHATS
WESTERN GHATS
DECCAN
Krishna R.
Cauvery R.
NILGIRI HILLS
MALABAR COAST
COROMANDEL COAST
ARABIAN SEA
BAY OF BENGAL
ANDAMAN IS.
CEYLON
INDIAN OCEAN
ELEVATION IN FEET
OVER 10,000
3,000 TO 10,000
600 TO 3,000
SEA LEVEL TO 600
0
150
300
SCALE OF MILES

Map 2. Landforms.

lowland because it is drained by the Indus and Ganges rivers and their many tributaries. The lowland is covered to great depths by layers of sand and clay deposited over a long period of time by the many silt-laden rivers that reach the plain. Fed by summer downpours and the melting of snowfields and glaciers in the surrounding mountains, these rivers carry much sediment as they rush onto the plains. When their currents weaken upon reaching the level land of the plain, the rivers deposit their heavy load of silt to form flat, fertile lands called *alluvial plains.* These rich lowlands support hundreds of millions of farmers. *Fig. 1*

The Deccan Most of the area south of the Indo-Gangetic Lowland is a plateau of ancient hard rock. Known as the Deccan, the plateau tilts downward from west to east and has an average elevation of 2,000 feet. Steep cliffs, called *ghats,* mark the edge of the plateau and separate it from the coastal lowlands that border it on both the east and the west. The eastward tilt of the plateau makes the western cliffs, known as the Western Ghats, higher and more distinct than the Eastern Ghats.

Between the northern edge of the plateau and the Indo-Gangetic Lowland are several low ranges of mountains and hills. More hill country occurs at the extreme south of the peninsula where the Nilgiri Hills and Cardamon Hills both rise to heights of more than 8,500 feet.

The surface of the Deccan in the northwest near Bombay has been covered by black lava that once oozed from great cracks in the surface of the ancient plateau. Covering an area of 200,000 square miles, the black lava has since weathered to form black earth for which the area is famous.

The Western and Eastern Coastal Plains Between the Eastern Ghats and the Bay of Bengal is a densely populated coastal plain which extends inland for distances of up to 75 miles. This eastern coastal plain is known as the Coromandel Coast. The coastal plain between the Western Ghats and the Arabian Sea is called the Malabar Coast. It is comparatively narrow and is divided into sections by the Western Ghats which reach the sea as high cliffs in several places.

The Island of Ceylon Ceylon can be considered a physical extension of the southern part of the Indian peninsula. It is completely bordered by low-lying coastal plains. The widest part of the coastal lowland is in the north where there is a broad, limestone plain. Many swamps occur along the coasts. In the south, a broad and fertile plain rises gradually inland to a central mountain core in which some peaks reach heights of more than 8,000 feet.

Coasts The coastline of the subcontinent has few deep inlets. Consequently, there is a shortage of good natural harbours, and the coastline is comparatively short. Although the subcontinent roughly equals the continent of Europe in area, its 5,000-mile coastline is dwarfed by the much-indented 23,000-mile coastline of Europe. The rocky west coast has only one good natural harbour, the

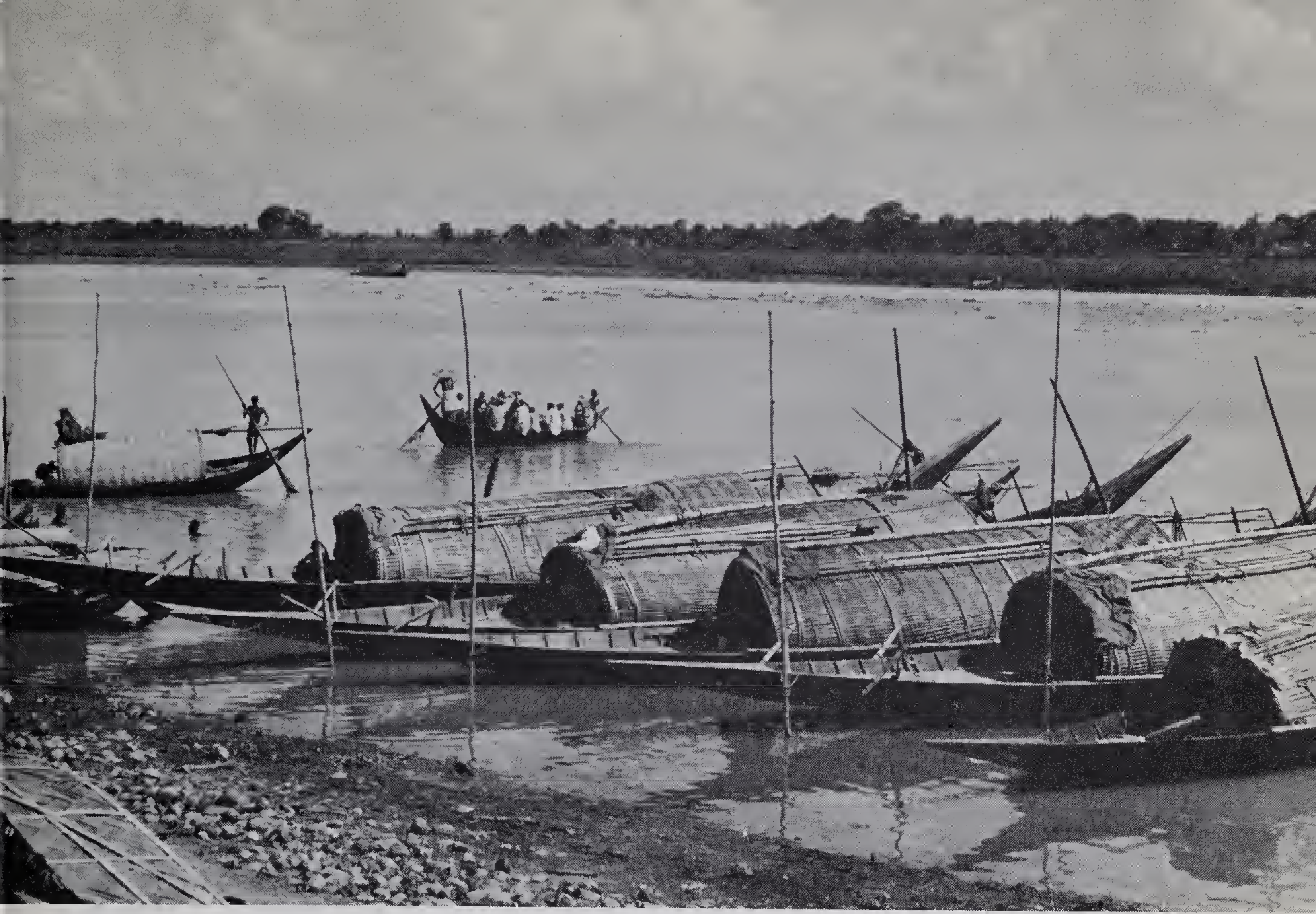


Figure 1. Native Craft in East Pakistan.
Much of East Pakistan consists of low, wet delta land that is criss-crossed by numerous rivers and subject to widespread flooding. Under these conditions native boats, like those seen in the picture, offer the best means of transport, especially in time of floods.

harbour of Bombay. The waters off the east coast are generally too shallow for the docking of large ships, without the benefit of man-made harbours. Even Madras, the largest port on the east coast, has an artificial harbour. The mouths of the Ganges River provide natural harbours on the delta, notably at Calcutta and Howrah. *Fig. 1*

The coast of Ceylon has a few spacious inlets suitable as natural harbours, but Colombo, the chief port of the island, has a man-made harbour.

RIVERS

The lives of hundreds of millions of people in Pakistan and India are strongly influenced by three river systems: the Ganges, the Indus, and the Brahmaputra. These rivers have deposited rich soils on the Indo-Gangetic Lowland, so that farming is the chief occupation of the region. Greater crop yields and increased farm acreage, needed to feed the teeming millions who inhabit this area, are obtained by using water from these rivers for irrigation. Although not ideal for transportation and hydro-electric power production, the rivers are navigable along some stretches, and hydro-electricity is generated at many of the large irrigation dams. Unfortunately, these northern rivers often overflow their banks and even change their courses during the rainy season. The rampaging flood waters cause heavy loss of life, serious crop damage, and the widespread destruction of roads and buildings.

The 1,500-mile Ganges River is so important to the people of India that it is considered sacred by the largest religious group, the Hindus. Several strong tributaries join it as it flows across northern India. In East Pakistan it merges with the Brahmaputra before emptying into the Bay of Bengal through the Ganges delta. This huge delta has a maximum width of 200 miles. It is crossed by the great maze of streams that form the mouths of the Ganges and Brahmaputra Rivers. The seaward margin of the delta consists of a huge swamp. Known as the Sundarbans, this swamp region is three times the size of Prince Edward Island.

The source of the Indus is in Tibet, but several of its largest tributaries rise in northwest India. The Indus is navigable for small steamers to Hyderabad, 120 miles from its mouth on the Arabian Sea. However, the chief value of the Indus is for irrigation in the drylands of West Pakistan.

Map 2 Several large rivers cross the Deccan. Chief among these are the Mahanadi, Godavari, Krishna, and Cauvery. Due to the plateau's eastward tilt, these rivers all drain into the Bay of Bengal. They have low water levels in the dry season because they are completely dependent on the seasonal rains for their water. Thus their value as a source of water for irrigation during the dry season is limited.

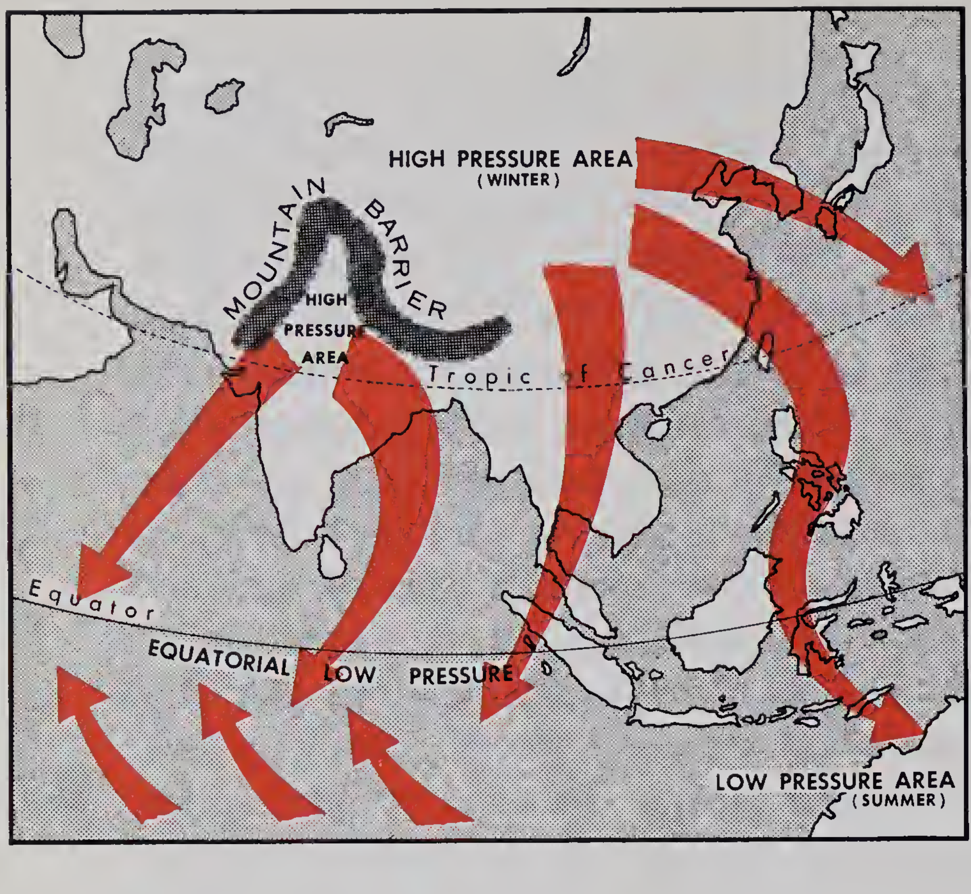
The rivers of Ceylon are navigable for only a few miles inland and even then only by small boats. However, they are valuable for both irrigation and generation of hydro-electricity.

CLIMATE

The subcontinent lies within four climatic regions: (1) Tropical Monsoon climate is the most widespread; (2) Wet Tropical climate prevails in southern Ceylon; (3) Tropical Desert climate occurs in the eastern part of the Indus Plain, which is occupied by the Thar Desert; and (4) Highland climate is found in the mountain areas.

Tropical Monsoon "Monsoon" is derived from the Arabic word *mausim* which means season. The monsoon is a wind that completely reverses direction according to the seasons. This is a result of the heating of large land masses in summer and the cooling of the same land masses in winter. The intense heating of the land in summer establishes a low pressure area over northwest India. During the same period, a high pressure area develops over the relatively cooler southern Indian Ocean. Since air always moves from areas of high pressure to areas of low pressure, summer winds *Map 4* blow from the seas to the land. In winter, the cooling of the land causes a change in the pressure systems. During that season, a high pressure area develops over the now cooler northwest, and a low pressure area develops over the southern Indian Ocean. Due to the reversal of air pressure, wind direction is now opposite to that of summer; winter winds, therefore, generally blow from the land to *Map 3* the surrounding areas. The paths followed by these monsoon winds and the location of the pressure systems that create them may be seen in the accompanying diagrams.

Heavy rainfall accompanies the summer winds which blow in from the ocean, laden with moisture. Rain is particularly heavy where the incoming winds from the Indian Ocean first strike land in southern Ceylon and along the west coast of peninsular India. Winds from the Bay of Bengal bring heavy rainfall to the northeastern part of the subcontinent. These rains are very heavy where the moisture-laden air comes into contact with the Assam Hills and eastern Himalayas. Cherrapunji, in Assam, which receives a near-record 451 inches of annual rainfall, gets most of its rain during this summer monsoon season. The rainy season ends in late October. Dry conditions prevail during the remainder of the year because the winds are then moving from land to sea.



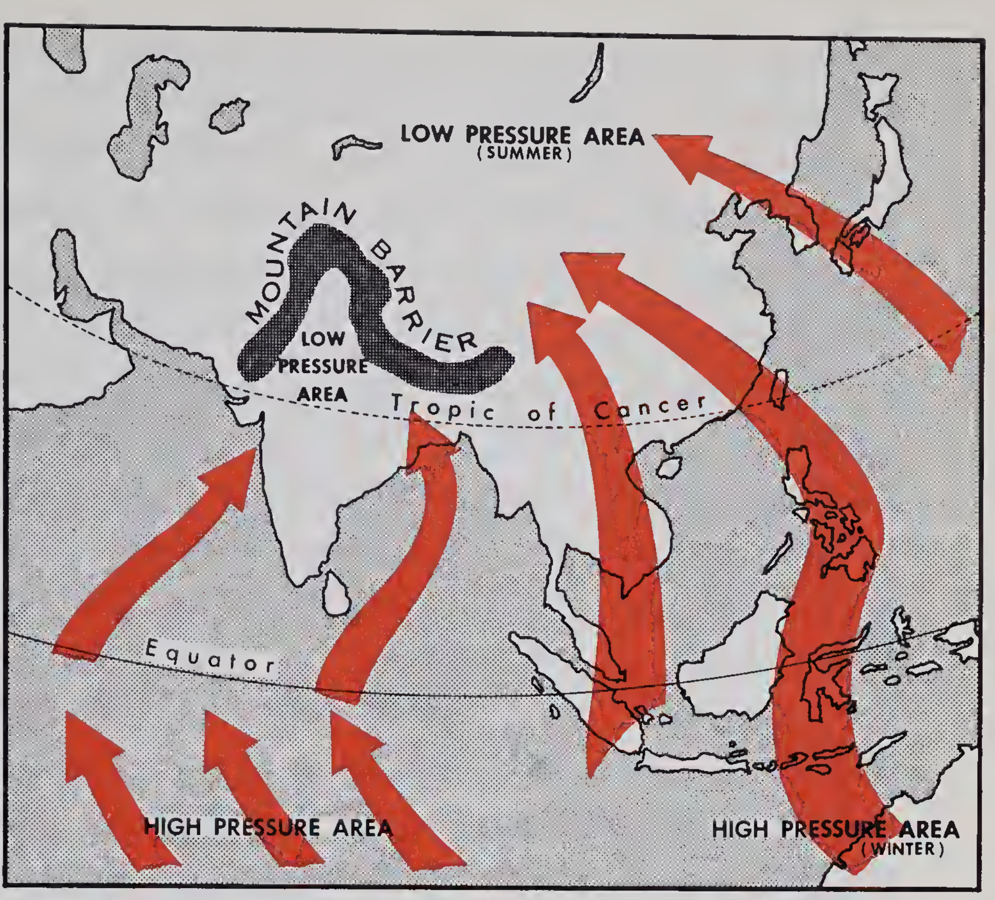
Map 3. Path of Monsoons — January.

Note the complete reversal in wind direction between the winter and summer seasons. What effects does this reversal have upon the rainfall pattern?

Not all parts of the Tropical Monsoon region get large amounts of summer rainfall. Most of the Deccan is dry because the southwest summer monsoon loses much of its moisture on the windward slopes of the Western Ghats. Moderate to low summer rainfall is also found in the Indus and Upper Ganges Valleys. Because the air from the Bay of Bengal gradually loses its moisture as it moves up the Ganges Valley and into the Indus Valley, dryness increases towards the west. This creates dry areas in northwestern India and West Pakistan.

Although the Tropical Monsoon region experiences only two monsoons, it is usual to divide the year into three seasons: the "wet", and the "cool", and the "hot". In the "wet season" (June to October) temperatures average over 80°F. During the "cool season" (November to January) temperatures are comparatively low, ranging from 40° to 55°F in the north and west but rising into the high sixties as one goes eastward and into the seventies to the south. From February through May, during the "hot season", temperatures return to the eighties and beyond. By Canadian standards, the "cool season" is quite mild. It earns its name by

Map 4. Path of Monsoons — June.


LOW PRESSURE AREA
(SUMMER)
MOUNTAIN BARRIER
LOW
PRESSURE
AREA
Tropic of Cancer
Equator
HIGH PRESSURE AREA
HIGH PRESSURE AREA
(WINTER)

being cool compared to the extreme heat of the other two seasons. Much of the rain that falls is lost through evaporation caused by the high temperatures. Normal farming without irrigation is, therefore, possible only in areas receiving more than 30 inches of rain in a year.

Wet Tropical The southern part of Ceylon receives rain in both summer and winter. Like most of the subcontinent, this area receives rain from the summer monsoon. But, unlike the other regions, the outflowing winter monsoon must pass over the Bay of Bengal before reaching Ceylon. The resulting winter rain, when added to that of the summer months, gives southern Ceylon a Wet Tropical climate. Because of the two rainy seasons caused by different monsoons, this type of climate is also called the *double-monsoon* type. The southeast coast of India also benefits from rain brought from the Bay of Bengal by the winter monsoon.

Tropical Desert The northwestern part of the subcontinent consists of the Thar Desert and a large area that is semi-desert. Neither monsoon brings reliable rainfall to the region. As a centre of high pressure in winter, it receives no rain during that season.

Nor do the summer winds that flow into this area bring much rainfall. These summer winds are either dry westerly winds from the arid continental interior, or easterly winds that have lost their moisture during the long journey up the Ganges Valley.

Highland Elevation greatly reduces temperatures in the mountain areas, giving them a Highland climate. The highest areas have *Fig. 2* a permanent covering of snow and ice. The lower slopes are always cooler than the adjacent lowlands. During periods of extreme heat on the lowlands, many people move to the cooler hill stations.

The high wall created by the mountains and plateaus of Kashmir and Tibet has a strong effect upon life in Pakistan and India. Because they tower over 12,000 feet, these landform barriers prevent the cold winter air of central Asia from moving southward into the subcontinent. Pakistan and India thus have much milder winters than lands at the same latitude in the Far East which are chilled by cold winds from the icy continental interior during winter. Cultivation can, therefore, be carried on in most parts of Pakistan and India the year round.

NATURAL VEGETATION

The Indian subcontinent has been densely populated for so long that most of the land is now used either for cultivation, for grazing, or for settlement. As a result, the natural vegetation has been greatly changed by man and his livestock. Little remains of the original forests once found everywhere except in the dry northwest. Now, only about a fifth of the surface is covered by forest. In heavily populated areas, the only uncultivated land is poor scrub, with a low-quality grass cover and scattered trees of little value. Commercial forest is so scarce that farm buildings are usually built of mud.

The best remaining forests are located in the Assam Hills, in scattered upland areas of the Deccan, along the Western Ghats, and in Ceylon. In recent years, government measures to conserve these forests have been introduced.

Although most of the once-forested lower Ganges region has been cleared for farming, tropical rainforests still thrive in hill areas and in the swamps (Sundarbans) of the huge delta. Mangrove trees grow in this and other swampy coastal areas, Palms are numerous along the better-drained sandy shores. Typical of inland species of the rainforest are mahogany and ironwood.

Lighter tropical, or monsoon, forests once covered the Upper Ganges Valley and the northeastern part of the Deccan. Extensive cutting for fuel and clearing for farming and grazing have reduced the number of trees. Teak and sal are typical trees in the wetter parts of these open deciduous woodlands. Here, undergrowth consists of small evergreen, broadleaved trees, and bamboos. In the drier (under 40 inches) areas, the banyan is typical. The shorter trees shed their leaves in the dry season. The word “jungle”, derived from the Indian word “jangal”, is used to describe these tropical deciduous forests and the tangled thickets that replace them after they are cut down. The term “jungle” is often incorrectly applied to dense rainforest; it properly refers to a thick growth of brush, vines, and tall grass.

When the deciduous trees of the monsoon forest shed their leaves during the rainless period, the countryside takes on a dusty brown colour which the Hindu inhabitants call khaki — a word that the British soldiers in India long ago adopted to describe the drab colour of their uniforms.

Large areas of poor, semi-desert scrub remain in uncultivated parts of the Indus Basin and in the driest areas of peninsular India and Ceylon. This gives way to even poorer vegetation in the Thar Desert, where great ridges of sand cover wide stretches of country between belts of poor thorn scrub.

Vegetation in mountain areas shows well-marked zoning according to elevation. In the Himalayas, for example, tropical deciduous forests of sal, laurel, and oak grow up to the 4,000-foot level; coniferous forests of pine and cedar are found between 4,000 and 8,500 feet; forests of stunted larches and birches grow between 8,000 and 10,000 feet; alpine mosses and lichens are found above 10,000 feet. The uppermost slopes of the highest peaks are ice deserts. *Fig. 2*

WORK UNIT —

The Language of Geography Add to your reference list definitions for the following terms: Hindu, Moslem, alluvial plains, Deccan, ghats, hydro-electricity, monsoon, jungle, rainforest, khaki.

Problems and Projects

1. Calculate the exact percentage of the total area of the subcontinent occupied by Pakistan, Ceylon, and India.
2. Draw bar graphs to compare and illustrate the populations of India, Pakistan, Ceylon, Canada, U.S.A., and the United Kingdom.
3. Report on the conquest of Mount Everest by Sir Edmund Hillary.
4. Compare the height of Mount Everest with those of the highest peaks in Canada and the United Kingdom.
5. Why are the Indo-Gangetic Lowlands so fertile?
6. How do the rivers of the Indian subcontinent influence the lives of the people?
7. Indicate the source and mouth of the Indus, Ganges, and Brahmaputra rivers.
8. Describe life in Calcutta during the "wet" monsoon season.

Maps

1. Locate a world map in your atlas. Trace maps of India and Canada. Superimpose the India map on the map of Canada.
2. Shade a map of India to indicate the areas which receive the greatest amount of precipitation.

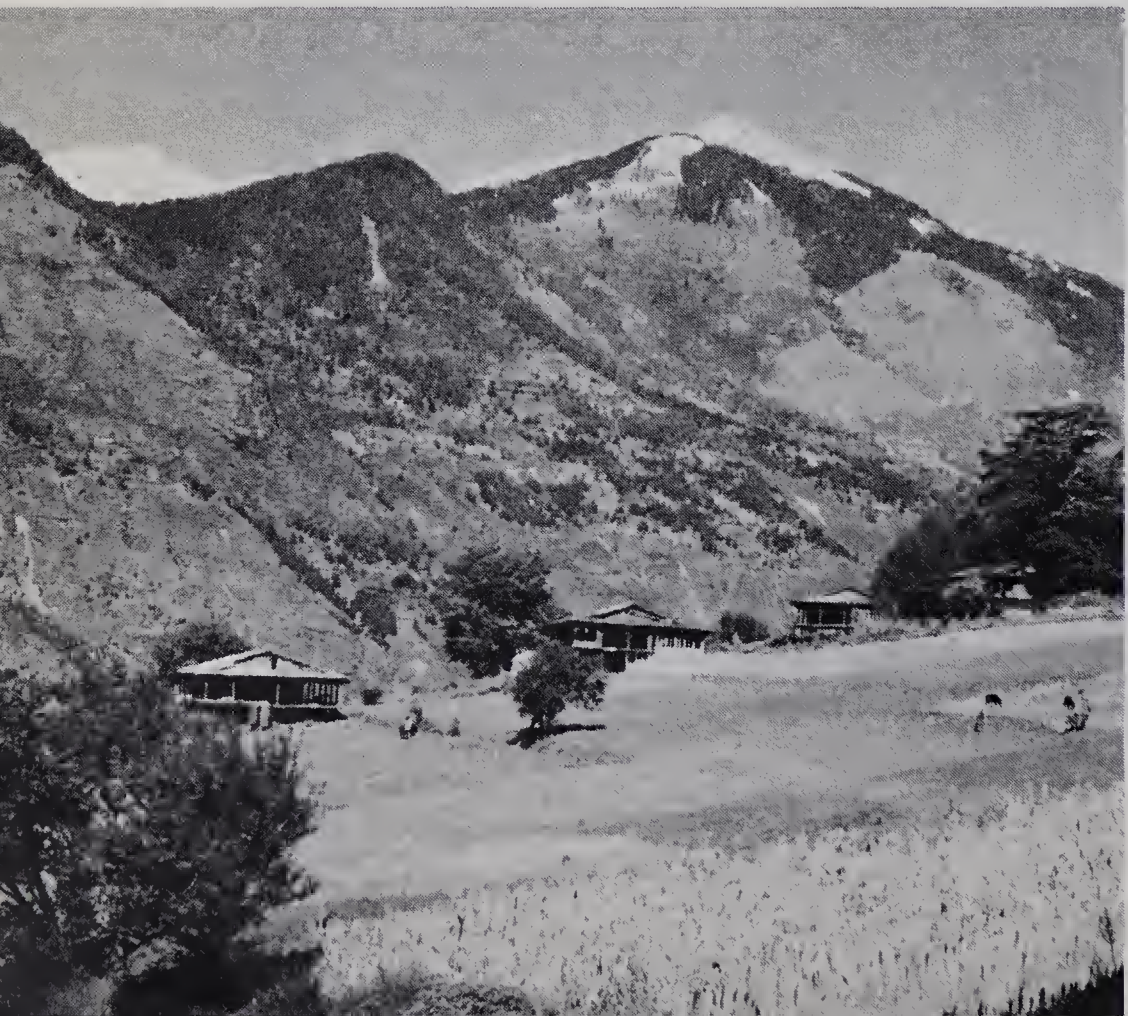


Figure 2. Rice Fields in the Himalayan Foothills. *Because rice offers the highest yield per acre of any grain, it is grown wherever possible in Asia. Here we see it being grown in a valley flanked by mountains with forested slopes and snow-capped peaks.*

PEOPLE

Over half a billion people live in the Commonwealth countries of South Asia. That is *30 times* as many people as live in Canada! The population density of nearly 350 persons per square mile is six times the world average. Concentration of this great multitude of human beings on a few favoured farm lands creates some of the highest rural densities in the world. For example, the fertile lower Ganges Valley contains districts with more than 800 people per square mile. Densities rise to more than 1,300 on the Ganges Delta, along the Malabar Coast, and in the intensively cultivated parts of southwestern Ceylon.

Considerable mixing of races has taken place in South Asia, but two main streams can still be distinguished: the Aryans in the north and the Dravidians in the south. The Aryans are descendants of conquerors who long ago swept in from the northwest and drove the Dravidians into the south. In general, the Aryans are lighter-skinned and have thin noses, while the Dravidians are dark-skinned and have broad noses. Small groups of primitive tribesmen live in remote and inaccessible areas. Their forefathers, the original inhabitants, were driven into these less desirable areas many centuries ago by the successive waves of invaders.

Languages and Education Over 200 languages and several hundred additional dialects are in daily use, but most are spoken by comparatively small groups. The seven largest language groups include more than 70 per cent of the population. Hindi, the official language of India, is spoken by almost one-third of the people. English has been important ever since the British colonial days and is still commonly used in business and government circles. The use of so many different languages creates serious communication problems and hinders national unity.

Throughout South Asia, the illiteracy rate is very high. In India, for example, less than one-quarter of the population can read and write. Determined efforts are being made to improve the opportunities for education, but the vast population and the rate at which it is growing make progress difficult. The small number of well educated people is a big barrier to economic progress in all South Asian countries.

Religions Two of the world's great religions — Hinduism and Buddhism — had their beginnings in ancient India. Hinduism is still the dominant religion in India, where 85 per cent of the people are Hindus. Buddhism has almost died out in the land of its origin. However, many countries of East and Southeast Asia have large numbers of Buddhists, and Buddhism is the principal religion of Ceylon.

During and after the 16th century, Mohammedan invaders from the Middle East imposed the Moslem religion upon many people in the north. There are still 40 million Moslems in India despite the partition of the mainland into a predominantly Hindu India and the separate Moslem state of Pakistan. The Mohammedan religion claims 97 per cent of the people of West Pakistan and a large majority of those in East Pakistan. However, almost one-fifth of the people of East Pakistan are Hindus. Several other religions, including Christianity, each have a few million followers in South Asia.

Religion plays a major role in the daily lives of the people. Pakistani Moslems and Ceylonese Buddhists faithfully observe their prayers and rituals. Hinduism controls the customs, diet, occupations, and many other aspects of the lives of its followers.

In many ways Hinduism is more a way of life than a religion. Most Hindus eat no meat and believe that the cow and other animals are sacred. Family ties are very strong, and the aged are highly respected. Unlike most Western religions, Hinduism has many gods and goddesses, each with a specific role. Under its influence, people usually are gentle, tolerant, and peace-loving, because it urges them to love all living things and to curb their desires for the material things in life.

Caste Hinduism includes a caste system that places a person for his entire lifetime in the social class into which he was born. The system discourages social contacts and marriages between people of different castes and often forces an individual to follow the occupation of his father. There are several castes, ranging from the priestly Brahmans to the lowly Pariah. Commonly known as the untouchables, the Pariah group do the menial tasks, such as sweeping the streets, and must live in miserable huts set apart from the villages. However, the linking of caste to occupation is breaking down, especially in the cities, and some of the severest discriminations against the untouchables have been forbidden by law.

Moslems are the largest religious group in Pakistan and form a sizable minority in India. They are the followers of the Prophet Mohammed, who long ago lived in Arabia. Their religion is known as Islam, meaning "submissive". As in the case of Hinduism, Islam plays an important role in the lives and daily actions of its followers. Their holy book, the *Koran,* and Islamic canon law guide the Moslems on almost every occasion. Men who are strict Moslems drink no intoxicating beverages, eat no pork, wear the turban or fez as a head covering, and perform five prayers daily while facing towards Mecca. Unlike the Hindus, Moslems worship only one God — the same God as is worshipped by Christians and Jews. Since they all developed in the Middle East, the Christian, Jewish, and Moslem religions have many other common characteristics.

Way of Life Four-fifths of the people live in small, drab, rural villages where life has changed little in the last thousand years. Women must still carry water from the village well and use animal dung for fuel. The homes are normally crude, one- or two-roomed huts made of sun-dried bricks and covered by thatched or tiled roofs. Few homes have electricity or plumbing. Furniture is scarce, and few dishes are used. Often food is eaten with the hands rather than with cutlery. Thousands of the rural villages are extremely isolated, not even a simple cart track linking them to the outside world.

Most of the people of the Indian subcontinent are still poor and unhealthy and are unable to read or write. However, they are proud of their ancient cultures. Their history, songs, stories, and poetry have been passed from generation to generation by word of mouth.

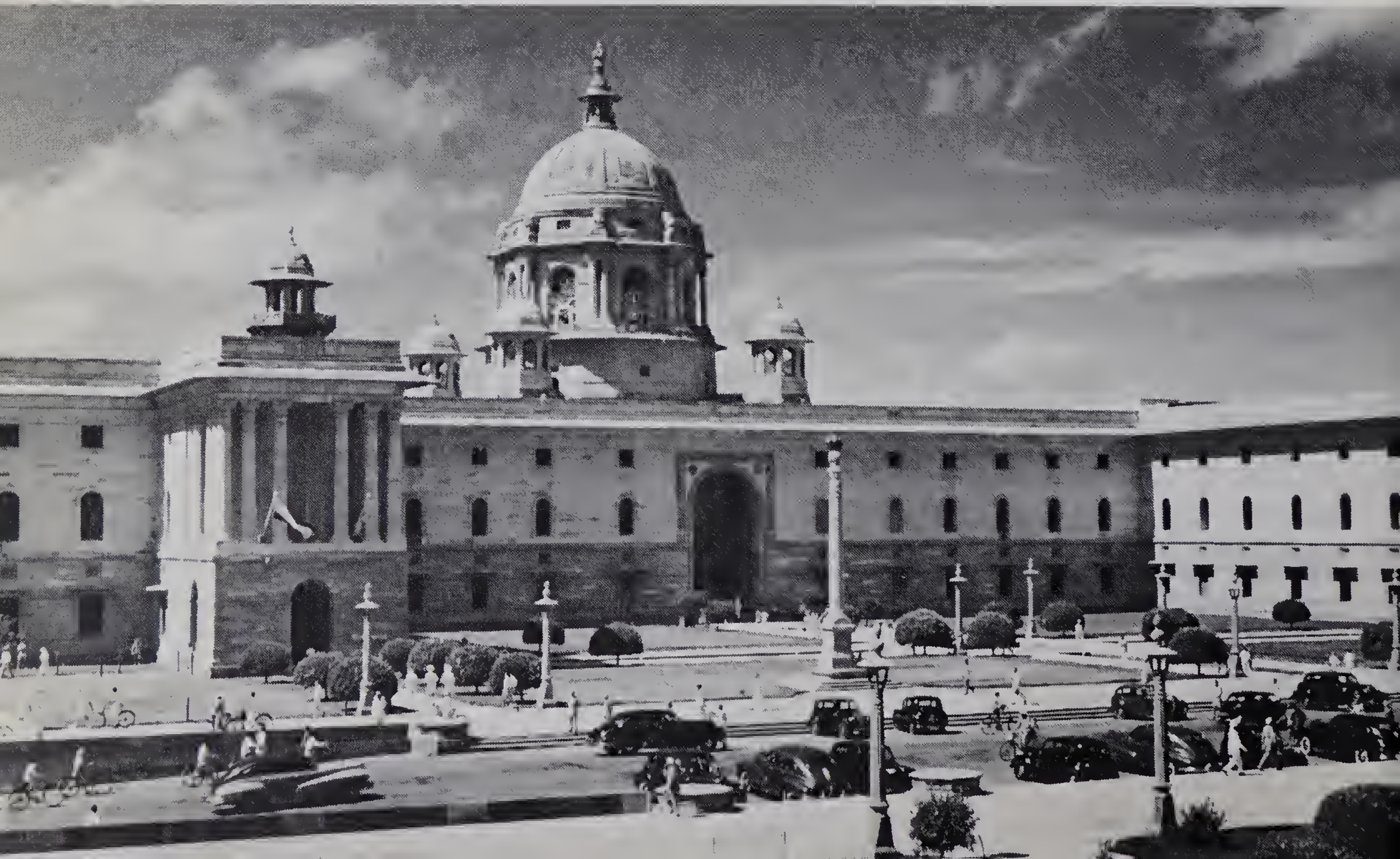
The government is attempting to improve conditions by building roads, improving irrigation systems, introducing electricity, providing manufactured cloth and metal utensils, offering technical advice to farmers, teaching millions to read and write, and training *Fig. 9* many in new skills. However, barriers of religion, custom, and language, combined with a shortage of government funds, make progress painfully slow.

URBAN DEVELOPMENT

Most of the people live in thousands of scattered rural villages, each averaging about one hundred houses. Because there are not enough industrial and commercial activities to support many large centres, big cities are few in comparison to the large population. However, increasing trade and industrialization are encouraging the growth of cities and towns. Six cities in India and two in Pakistan each have more than one million citizens, and there are numerous cities with more than 500,000 inhabitants.

Fig. 3 *Delhi* (2,344,000) is situated in India on the Jumna River, which is a major tributary of the Ganges. Because of its central location, Delhi was chosen as the capital of British India in 1912. Today the city has two parts: New Delhi and Old Delhi. The new

Figure 3. A Government Building in New Delhi.
During the period of British rule, several fine buildings like this one were constructed in New Delhi, the capital of India. Since the country received its independence, the buildings have been used by the Indian government. Note and account for the types of transportation being used here.



part has broad boulevards, modern office buildings, fine hotels, apartments, and private homes. It was built by the British as a modern administrative city and now serves as the capital of the Republic of India. Old Delhi is a walled city with mosques, palaces, and narrow crowded streets. Cotton from nearby farms is spun and woven in large mills and on handlooms in many homes in the old city. Delhi is also famous for its beautiful handicrafts, which include jewelry, carved ivory, and embroidery.

Bombay (4,146,000) is the ocean gateway to western India. Situated on an island in the Arabian Sea, this great port handles about one-quarter of India's trade in its magnificent harbour. Of Bombay's many industries, cotton spinning, based on raw cotton from the nearby Deccan, is the most important.

Calcutta (2,926,000) is located 70 miles from the mouth of the Hooghly River, the westernmost channel of the Ganges Delta. Since the Hooghly is navigable far inland, it provides an excellent harbour for the city. Calcutta is the chief port of India and the world's principal exporter of raw and processed jute. One-quarter of India's factory output is manufactured in plants along the banks of the Hooghly River. Factories line both sides of the river for 60 miles to form a great industrial area with Calcutta as its centre.

Calcutta benefits from a good location. The Hooghly provides a good harbour; canals bring raw jute from other parts of the delta; and nearby sources of coal and minerals supply fuel and raw materials for manufacturing industries. Because of its favourable location, Calcutta has become one of the leading ports of Asia. It is the chief commercial and financial centre of India.

Madras (1,725,000) is the leading industrial and commercial centre of south India. Although it has a man-made harbour, Madras is the chief port on the Coromandel Coast. *Hyderabad* (1,252,000) is a major transport junction and trade centre on the Deccan.

Karachi (2,100,000) is the natural outlet of the Indus Valley. *Fig. 12* Wheat and cotton from the interior are shipped from its deep natural harbour. Indeed, two-thirds of Pakistan's foreign trade passes through Karachi. Its strategic location on world travel routes has made Karachi a major international seaport and air terminal. In 1947, Karachi was chosen as capital of the newly formed state of Pakistan, but later the capital was moved to a site near the inland industrial centre of *Rawalpindi* (343,000). The leading centre of trade and distribution in the northern interior of West Pakistan is *Lahore* (1,297,000).

Dacca (558,000) is the capital of East Pakistan. It also acts as a centre of trade for the productive rice and jute areas around it. When the partition of 1947 cut Calcutta off from the Pakistani section of the Ganges Delta, that great port lost a large part of its natural hinterland to *Chittagong* (295,000). As a result, Chittagong became the chief port of East Pakistan.

The location of *Colombo* (600,000), the capital of Ceylon, makes it a natural port-of-call for ships travelling the Suez Canal route. Colombo also handles the majority of Ceylon's foreign trade because it serves the island's great tea and rubber areas. Colombo so dominates the trade, commerce, and government activities of the island that there is no other major Ceylonese city.

WORK UNIT —

The Language of Geography Add to your reference list definitions for the following terms: Aryans, Dravidians, Hindi, illiteracy, caste system, Koran.

Problems and Projects

1. Draw bar graphs to illustrate population densities in: (a) the Indian subcontinent; (b) lower Ganges Valley; (c) Ganges Delta; (d) southwest Ceylon.
2. Explain how the numerous languages of India may create communication problems.
3. How does the Hindu religion differ from the Moslem religion?
4. Report on the caste system of India.
5. Compare India's villages with villages in your province.

Maps

On a large outline map of the Indian subcontinent, locate the six largest cities. Paste on this map (in appropriate locations) bits of cotton cloth, rice, jewelry, etc., to illustrate products and industries in the general areas of the cities.

AGRICULTURE

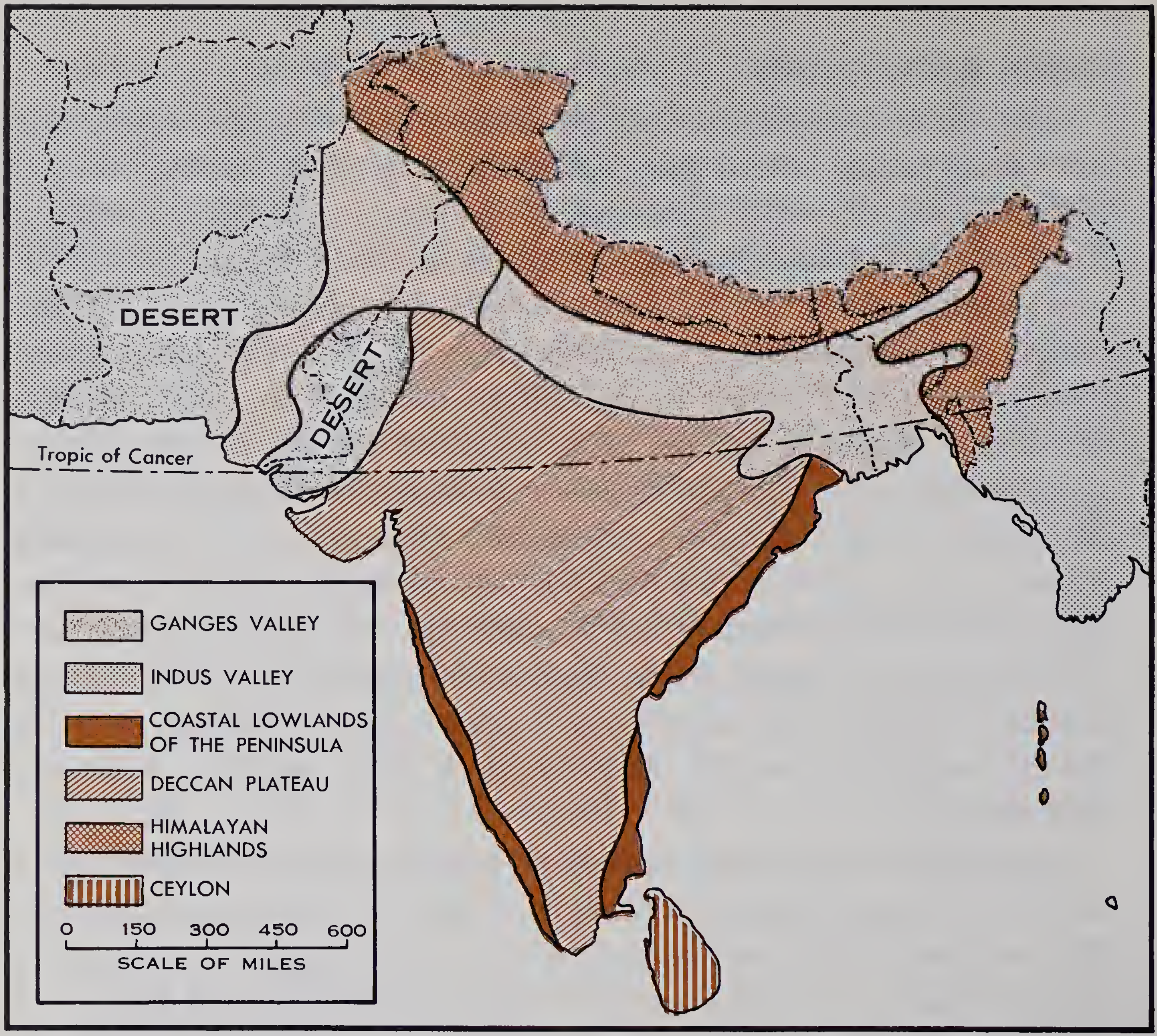
Only the Soviet Union and the United States have more arable land than India, which has 325 million acres. Pakistan has 60 million acres of cultivable land. Thus Canada, with 97 million acres, has less than one-third as much arable land as India, but considerably more than Pakistan. More than two-thirds of the people of the subcontinent are farmers, who grow enormous quantities of food and other crops. India, for example, ranks among the world's major producers of rice, wheat, barley, peanuts, sugar cane, cotton, jute, tea, and tobacco. Pakistan is among the leading producers of jute, cotton, and wheat. Ceylon is an outstanding grower of tea and a major producer of coconut products and natural rubber. Unfortunately, the farmers are so numerous that most of the farms are very small. The chief concern of the average farmer of South Asia is to grow a food crop for himself and his family. Seldom is he able to produce a large surplus to provide cash income. *Fig. 6*

Agriculture varies from place to place in South Asia because the subcontinent includes regions with different growing conditions. We can best understand these differences by studying agriculture in six regions: (1) The Ganges Valley, (2) the Indus Valley, (3) the Deccan Plateau, (4) Ceylon, (5) the coastal lowlands of Peninsular India, and (6) the northern mountains. *Map 5*

The Ganges Valley Flooded fields of rice and jute create a sea of green on the huge delta of the Ganges River. Millions of farmers cultivate small plots that occupy eighty per cent of that hot, wet delta.

Jute: The delta has long been the centre for the cultivation of jute, one of the world's cheapest but most valuable fibres. Conditions are ideal for jute cultivation in the Ganges-Brahmaputra lowlands because of heavy monsoon rainfall, high humidity during the growing season, a well-saturated soil, and ample water for retting.

Few major crops require more man-hours of tedious labour than jute. Sown in a well-prepared seedbed, then weeded and gradually thinned, the jute develops a cane-like stalk which reaches a height


DESERT
DESERT
Tropic of Cancer
GANGES VALLEY
INDUS VALLEY
COASTAL LOWLANDS OF THE PENINSULA
DECCAN PLATEAU
HIMALAYAN HIGHLANDS
CEYLON
0 150 300 450 600
SCALE OF MILES

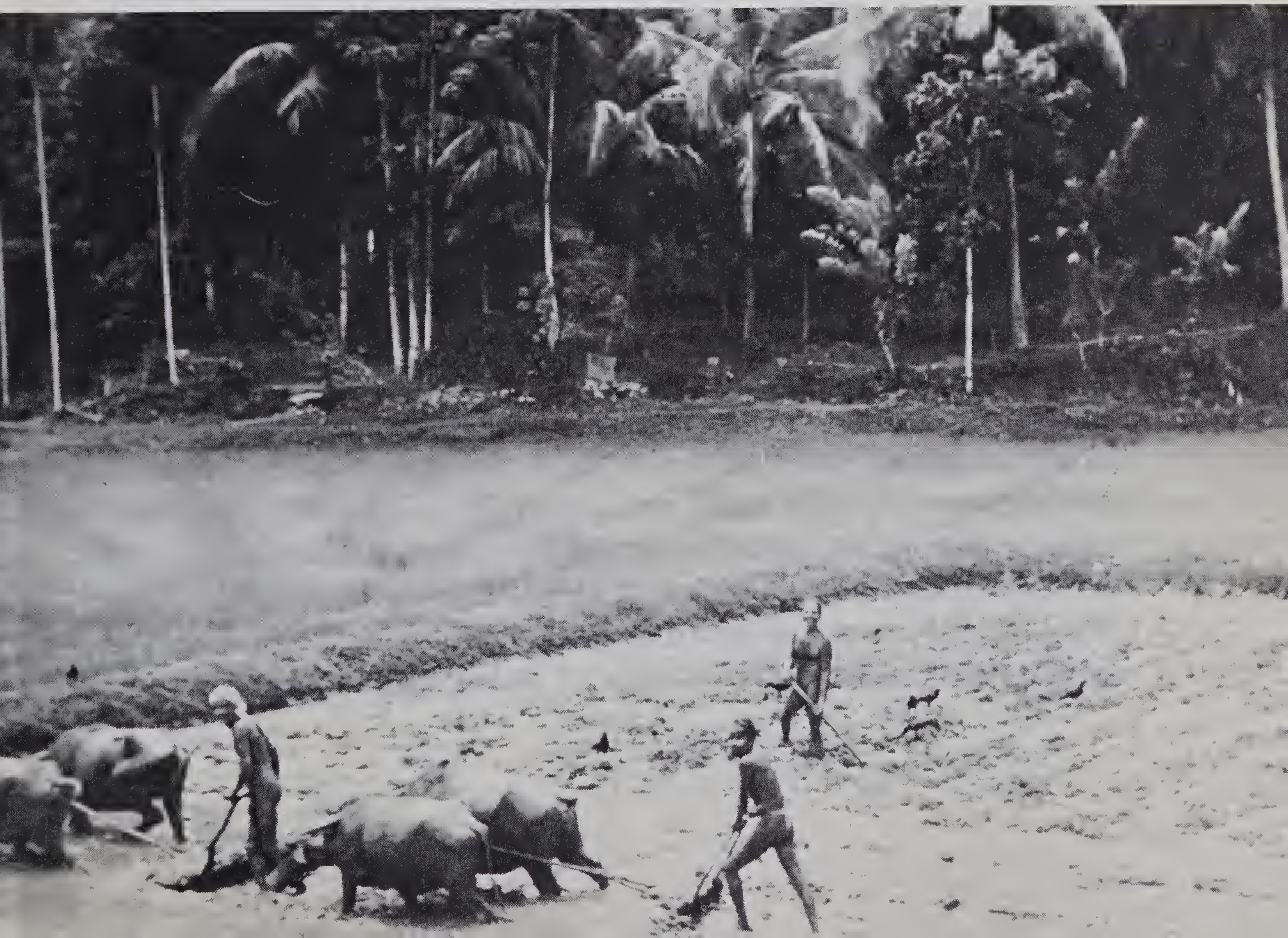
Map 5. Agricultural Regions.

of eight to ten feet in a five-month growing season. Cut by hand with a sickle, the stalks are tied in bundles and soaked in streams or ponds for 10 to 20 days. During this process, known as retting, the pith ferments and disintegrates so that the fibres can be stripped loose. After washing and drying, the soft, yellowish fibre is ready for market.

The great Ganges-Brahmaputra Delta produces 98 per cent of the world's jute, two-thirds of it in East Pakistan where it is the most valuable cash export crop. Before Partition, all the jute mills were along the Hooghly River in territory now inside the Indian borders. The newly created East Pakistan of 1947 had no jute mills, and Indian mills were separated from most of the jute fields by the new border. India is now planting more jute in its section of the delta, and East Pakistan has built several jute mills. Large mills in East Pakistan, near Dacca and at Chittagong, weave burlap for the foreign market. Part of the Pakistani crop is still exported through Calcutta, and the Hooghly mills of India are continuing to buy jute from East Pakistan for processing. The United Kingdom receives the biggest share of the raw jute exported abroad.

Rice: Although jute is the great cash and export crop, the welfare of the delta farmers is more dependent on rice. In contrast to the eight to ten per cent in jute, three-quarters of the cultivated land is devoted to rice. The annual rainfall of 60 inches or more is ample for rice culture. The rain is also well timed, since two-thirds of it comes during the hot growing season. Annual floods enrich soils over large areas with a thin coating of new alluvium.

Figure 4. Indian Farmers in a Rice Paddy.
The growing of wet rice requires a hot, wet climate. What indications of a hot climate do you see in the picture? What other conditions are necessary for the growing of wet rice?



Where moisture is sufficient, a second crop of rice is planted in the same year. Despite the large crops, rice production is insufficient to feed the population, and additional rice or substitutes must be obtained from West Pakistan.

Other crops: The Ganges Valley grows almost every kind of crop produced in the subcontinent. Rice, jute, and bananas are the main crops in the east. Cotton and wheat are the principal crops in the drier west where irrigation is used. Crops of barley, sugar cane, oil seeds, potatoes, tobacco, and corn are raised over a wide area.

Millions of acres in the middle and upper Ganges Valley are irrigated by canals and wells. Since well water is difficult to secure, it is used sparingly and only on high-value crops such as rice. Canals now water more land in South Asia than all the other systems of irrigation combined. This method is possible only in level areas where diversion canals can be built from large rivers or lakes to the fields. It requires the construction of expensive dams (barrages) to store water in reservoirs for drier periods and to raise the source of water above the level of the fields. Being higher than the fields, the water does not have to be lifted, but flows by gravity through an elaborate network of linking canals to the irrigation ditches.

Indus Basin The upper, or northern part of the Indus Valley consists of a region called the Punjab. It contains two-thirds of the area of the valley and nine-tenths of the people. The word Punjab refers to the area drained by the five chief tributaries of the Indus: *Map 2* the Jhelum, Chenab, Ravi, Beas, and Sutlej. The southern part of the Indus Valley is known as the Sind.

The Indus Valley is hot and dry in most areas. The eastern Punjab receives up to 20 inches of precipitation, but most sections of the valley are desert or semi-desert regions. Irrigation is, therefore, essential for successful agriculture in most of the valley, and modern engineering skill has turned much of the desert wastelands of the Punjab and Sind into a great oasis which produces valuable crops. Many barrages have been constructed across the Indus to divert river water into thousands of miles of irrigation canals.

Wheat is the most important crop. Half of it is grown on irrigated land. Barley and oil seeds are other spring-harvested crops. Millet and corn are autumn crops. Cotton is an important cash crop during the summer on irrigated land. The fibre is native to the Indus Valley, but higher-yielding American upland varieties have been introduced and now make up 90 per cent of the Pakistani crop. Rice and sugar cane occupy the rest of the irrigated lands of the Sind.

The Deccan Plateau The Deccan has black soils that resemble those of central Alberta in colour, in abundance of lime, and in fertility. They are low in humus, but even without fertilizers they produce excellent crops, and their texture is especially favourable for the retention of summer moisture for winter agriculture. Throughout the region, millet is the chief food crop for both man and beast. It is a summer crop and is rotated with wheat and linseed which will grow during the dry winter season.

Cotton is the chief commercial crop, but conditions are not too *Fig. 10* favourable for its cultivation. The short rainy period requires that quick-maturing short-staple varieties be grown. Unlike the Indus Valley, higher-yielding American upland varieties do not do well here. Most of the Deccan cotton is of inferior quality with fibres less than an inch long. Planting occurs as soon as the rains moisten the ground in June, and the growing season is somewhat lengthened by irrigation. Oil producing plants (particularly peanuts); sugar cane; and jowar, a corn-like grain; are the Deccan's other main crops.

The interior Deccan is a traditional famine zone. It lies in the rainshadow of the Western Ghats, so that rainfall is a relatively *Map 2* low 20 to 40 inches annually. Much of the moisture is lost through evaporation in the hot summer weather. Variations in both amount of annual rainfall and length of the wet season further increase the hazards of farming. To preserve water, small reservoirs, known as tanks, have been built; and numerous large reservoirs store rainfall in the areas of heavier precipitation near the Western Ghats. *Fig. 5*

The tanks have been constructed since very ancient times, and most villages of the Deccan have one. Some are shallow ponds

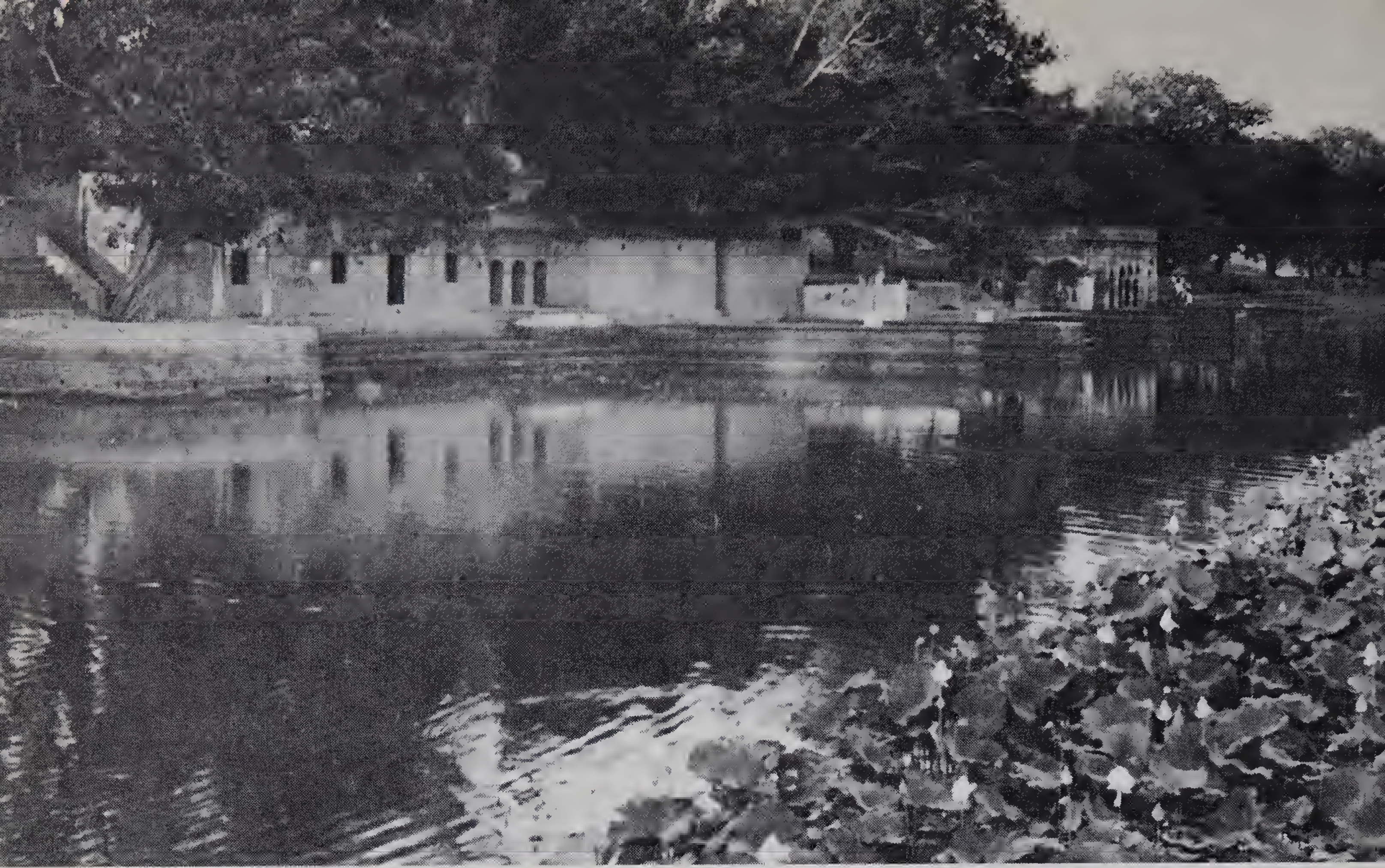


Figure 5. An Irrigation Tank in India.
Why are tanks like this necessary in many parts of India? In addition to irrigation, for what other purpose might this water be used? Covering the tank in the foreground are lotus plants.

dug to catch rain water, while others are made by damming streams. Some tanks cover many acres; others cover less than an acre. The village tank has many uses: to it come the cattle for water; in it are washed clothes and vegetables; into it is dumped the garbage; from it are obtained fish; and often it is the only supply of water for home use. Towards the end of the dry season, when the pond shrinks to a fraction of its normal size, the tanks develop a very unpleasant odour. Small wonder that cholera, malaria, and other diseases are widespread.

Ceylon The southwestern third of Ceylon, with a well-distributed rainfall of 70 to 150 inches, is known as the "wet zone". The extensive northern and eastern plains, which are comparatively rainless during the summer, are known as the "dry zone". Population is concentrated in the wet zone where the fertile coastal areas and upland valleys have a density of 500 to 1,000 people per square mile. The great majority of the native Ceylonese are farmers who support themselves by raising rice, coconuts, fruits, and vegetables. Some of them own rubber or tea estates in the central hill region.

The great plantations or estates are located in the wet zone. These were originally developed by Europeans, but now the number of Ceylonese owners is increasing. The chief crop is tea, which is grown mainly in the mountains. Rubber plantations are numerous at lower altitudes in the interior, and coconut trees cover extensive sandy areas north of Colombo and along the southwest coast. Cinchona plantations produce the drug quinine, and several spices are grown. *Fig. 6*

The Coastal Lowlands of Peninsular India Agriculture on the coastal plains of peninsular India resembles that of southwest Ceylon in several respects. Coconut palms abound on sandy coastal areas; tea, rubber, and cinchona plantations cling to damp mountain slopes; various spices are important; and rice is the chief food crop. However, the drier areas of Southern India are better developed for agriculture than the dry zone of Ceylon. Ancient tanks and wells and modern engineering works provide water for irrigation. Along the east coast, diversion canals at the head of the deltas bring water to the areas between the streams.

Rice, millet, sugar cane, coconuts, bananas, citrus fruits, cotton, and tobacco are all important in the south, but the big cash crop is peanuts. The Malabar Coast is noted for cashew nuts, coir, and such spices as ginger, pepper, cinnamon, and cardamons. The region produces nine-tenths of the world's cashew nuts and is the world centre for coir, the strong fibre extracted from the husk of coconuts.

The Northern Mountains Although the mountains of northern India and Pakistan are very thinly populated, valleys in the foothills are terraced to grow hardy grains, temperate fruits, and vegetables. The small valley of Kashmir is the home of four million farmers. Kashmir is famous for wool, from which skilled native craftsmen make beautiful rugs, shawls, and embroideries. ✓ Elsewhere in the northern mountain lands, cultivation is limited to fertile valley bottom lands and to terraced slopes. Crops include rice and sugar cane in the warmer valleys, and barley, wheat, corn, *Fig. 2* millet, and temperate fruits at higher altitudes where temperatures are cooler. Transhumance is well developed in many areas of these rugged but beautiful mountain lands. *Transhumance* is the common practice of moving livestock to highland pastures in summer and returning them to the lowlands for the rest of the year.

Plantation Crops Tea is the leading plantation crop and principal export of both India and Ceylon. It can be grown in the lowlands, but it thrives best on well-drained slopes between 1,000 and 4,000 feet in elevation. Tea requires continuous warmth and a long growing period followed by a dry period for ripening and picking. Assam and the central hills of Ceylon are the principal tea-growing districts; secondary areas are found in the eastern border hills of East Pakistan, the Darjeeling district in northern India, and the Nilgiri Hills of South India. The majority of the tea estates are owned by long-established British firms which employ many native labourers. As well as supplying a large home market, India and Ceylon export over half of the tea entering world markets. Tea is second only to jute as an export of East Pakistan.

Sloping land with good drainage, temperatures averaging 80°F, and reliable rains provide a suitable habitat for rubber. Southwest Ceylon and the coastal plains of peninsular India offer such a habitat and so have become important rubber-producing regions. Among Ceylon's exports, raw rubber is second only to tea.

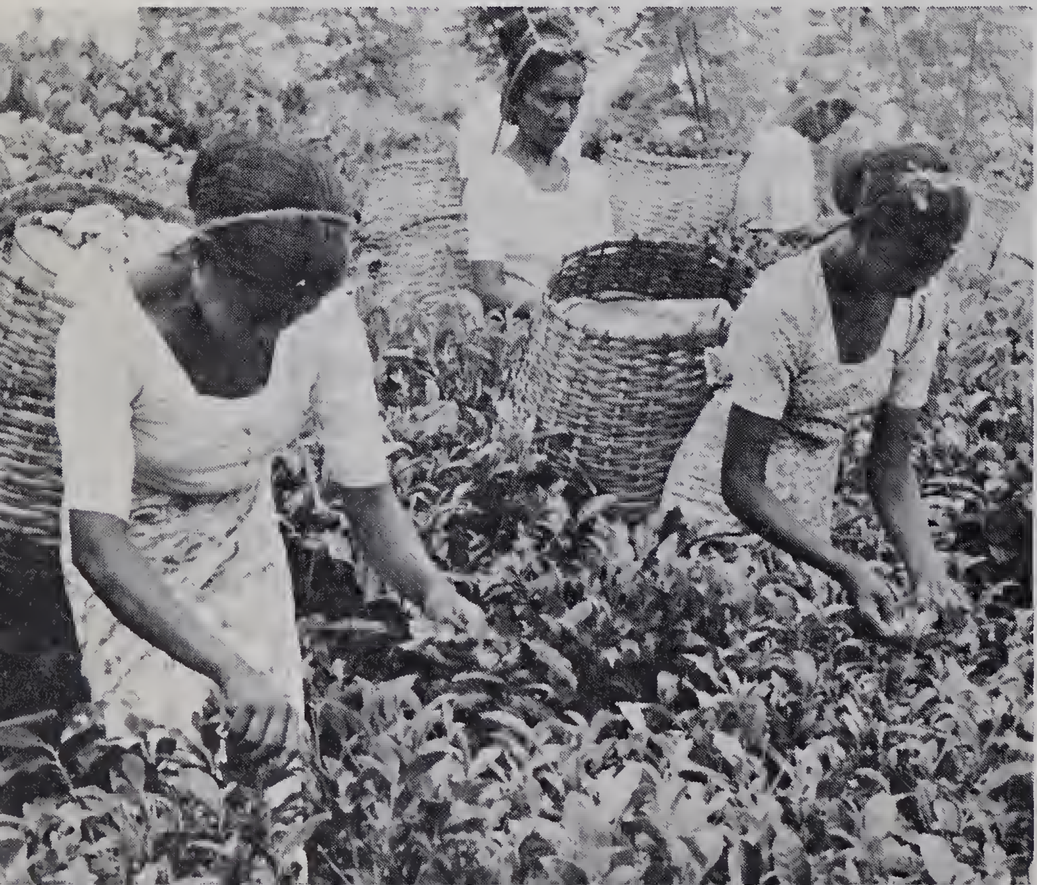


Figure 6. Picking Tea. *Tea is a major crop and leading export of both India and Ceylon. Women like these provide the cheap labour needed to perform the tedious job of picking the tea. Only the tender top leaves are picked. In many districts, the women carry the freshly picked leaves directly to the processing plants.*

√ **Livestock** India has the largest cattle population in the world, and Pakistan's cattle population ranks seventh. Humped cows (oxen) and water buffalo are found throughout South Asia. Hindus believe that the cow is sacred, and since the taking of life is forbidden, millions of useless cattle are allowed to live on, no matter how feeble or diseased they become. Oxen or buffalo are commonly used as draft animals. They provide the power for pulling carts and ploughs, turning grinding mills, or pumping water. Since good pasture is scarce and most of the animals are old, undernourished, and even diseased, milk production is amazingly low considering the number of cattle. The animals are of little value as food, since Hindus and many Moslems have taboos about eating meat. *Fig. 7*

Sheep are common everywhere except in the peninsular west coast, in the wetter areas of the northeast, and in Ceylon. Although India is sixth among the countries of the world in the number of sheep, the poor quality of the animals drops her place as a wool producer to twelfth.

The camel replaces the water buffalo as a beast of burden in the dry northwest, where it is used both for riding and ploughing. Donkeys, mules, and horses provide transportation and perform farm tasks in the mountains and foothills. Elephants do heavy work in Ceylon and in the lower Ganges Basin.

The wool, hides, and skins from the millions of animals supply raw materials for important woollen and leather industries and are the basis of many home industries such as weaving, leatherworking, and shoemaking. Raw hides and skins are among the principal exports of the subcontinent.

Agricultural Problems South Asian farmers grow immense quantities of agricultural produce on the vast tracts of arable land; but despite the huge output, the average farmer is not prosperous, and few agricultural products are available for export. Farming is so inefficient and the numbers of consumers to be satisfied is so great, that individual shares of the tremendous agricultural output are small. The farms are usually too small to provide a reliable livelihood, and once-fertile croplands have

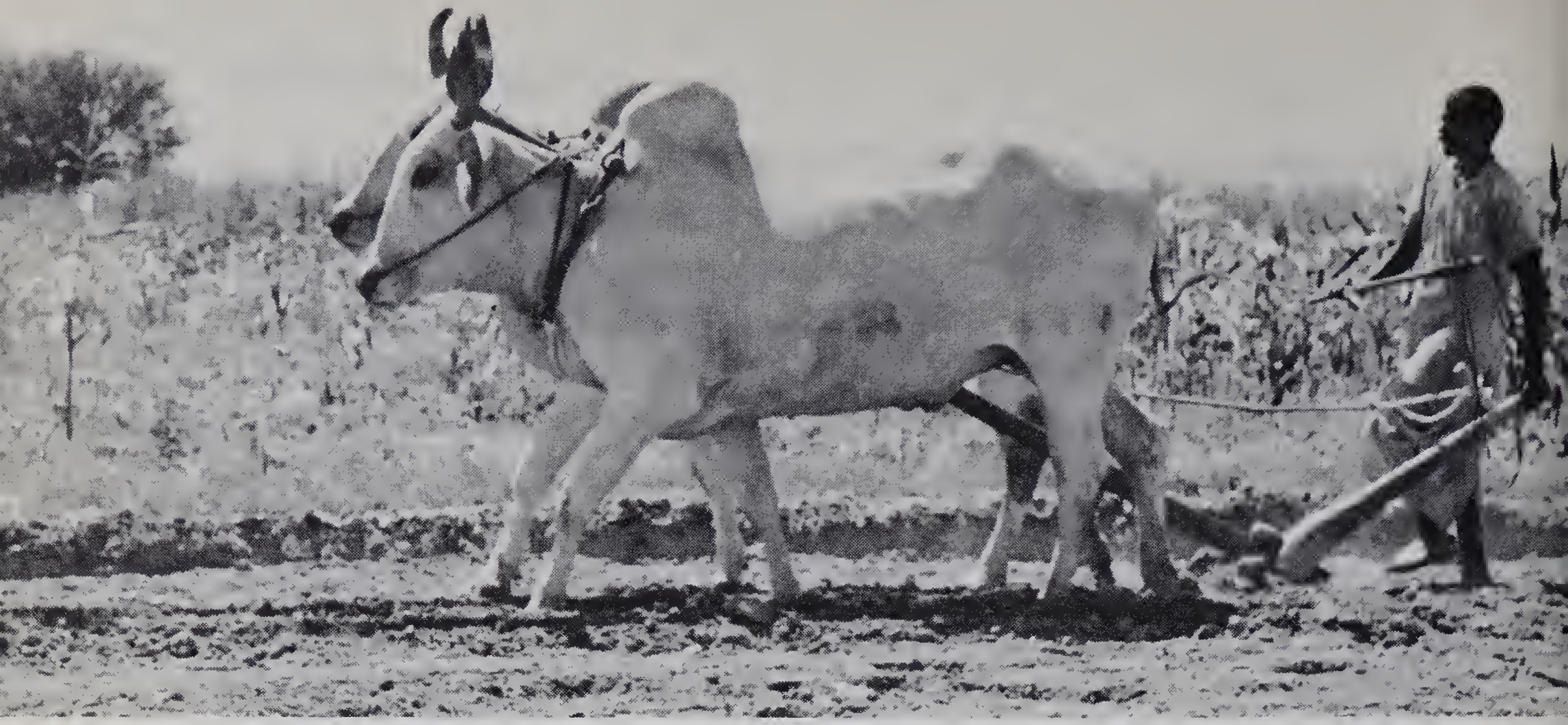


Figure 7. Ploughing in India.
Using oxen as draft animals, this Indian farmer tills the soil with a crude wooden plough. Scenes like this are typical of the primitive state of agriculture in the Subcontinent. Account for the type of clothing worn by the farmer in the picture.

become exhausted by overuse and neglect. Millions have been forced to cultivate land in regions where periodic droughts are a certainty.

Excessive subdivision of the arable land into tiny farms is the major problem. The equal division of farms among sons at the time of a father's death has been repeated so often in the ancient plains of South Asia that many farms plots are now only garden size. Although the holdings of a typical family usually include several such plots, total acreage is normally less than four. Much time is wasted as the farmers move from one plot to another among their holdings, and the scattered pattern makes the use of tractors and other farm machinery almost impossible.

Farms are too small to allow any part of them to lie fallow, and the poverty-stricken peasants have no money for commercial fertilizers. Natural fertilizers are scarce since most of the available animal dung is burned as domestic fuel. Crop rotations help in some cases, but, all too often, the alternate crops are not the type best suited to restore lost fertility to the soil. The heavy monsoon rains make things worse by dissolving and carrying away essential minerals from the soils.

The average Canadian farmer produces enough food for several families because he has had an opportunity to learn efficient farming methods and owns over 300 acres of land. Most Canadians are able to afford the farmer's products, the sale of which produces sufficient funds to buy machinery that increases output and lightens work. The Canadian farmer can also buy commercial fertilizers and good seed to ensure high crop yields. The peasant farmers of South Asia have no money for agricultural improvements because their tiny, inefficient farms produce only small surpluses of poor quality that sell for low prices in local markets. They are unable to improve yields by buying fertilizers, implements, weed and insect killers, or high-quality seed.

Figs. 4 & 7

The use of crude implements and primitive methods is typical of agriculture in South Asia. Plows are simple, iron-tipped sticks, which stir but do not turn the soil. They are usually pulled by oxen, water buffalo, or camels, depending on the area. Crops are reaped with hand sickles, threshed by the feet of cattle, and winnowed (removing the chaff from the grain) in the wind.

Fig. 9

During the last decade, the governments of South Asia have undertaken ambitious programmes to improve farming methods and to increase crop yields. These programmes will require great effort and large sums of money, much of which will have to come from outside the subcontinent. As a contributor to the Colombo Plan, which was set up to aid the underdeveloped nations of Southern Asia, Canada sends money, supplies, equipment, and technicians to India, Pakistan, and Ceylon. Typical of our contributions have been large shipments of wheat to meet food shortages, and money and technical assistance to aid in the construction of large irrigation projects. One such project includes a large dam at Massan in northeast India that has been named "Canada Dam" in recognition of our financial aid.

FORESTRY

The rainforests yield ironwood, mahogany, and other valuable tropical hardwoods that can be used for furniture, woodcarving, or for simple wooden tools. Mangrove trees are the only source of fuel in the swampy coastal areas. Commercial plantations in the rainforest areas of Ceylon and southern India contain many coconut palms and cinchona, the bark of which yields the drug quinine. Although grown mainly for coconut oil and copra, the coconut palm trees also provide the people with wood for fuel, leaves for thatching roofs, fibre for weaving, and shells for kitchen utensils.

p. 213 Teak, sal, and banyan are the chief timber trees of the lighter tropical forests. Tall, woody, treelike grasses called bamboo are widely used for construction, furniture, poles, and paper-making. The scrub and thorn trees of the dry areas have little value as timber but do provide some fuel. Sandalwood, which grows in the drier parts of southern India, is used for wood-carving and yields a scented oil.

WORK UNIT —

The Language of Geography Add to your reference list, definitions for the following terms: jute, sickle, double cropping, jowar, copra, transhumance.

Problems and Projects

1. List the agricultural crops of India, Pakistan, and Ceylon.
2. Why are India's agricultural crops different from Canada's? What are the crops that are similar?
3. Write a short report on the cultivation and production of jute or rice.
4. Why is there little fertilization of soils in India?
5. List the factors affecting population density in India. How does climate affect density?
6. Discuss the problems of the livestock industry of India. Suggest possible solutions for these problems.

Maps

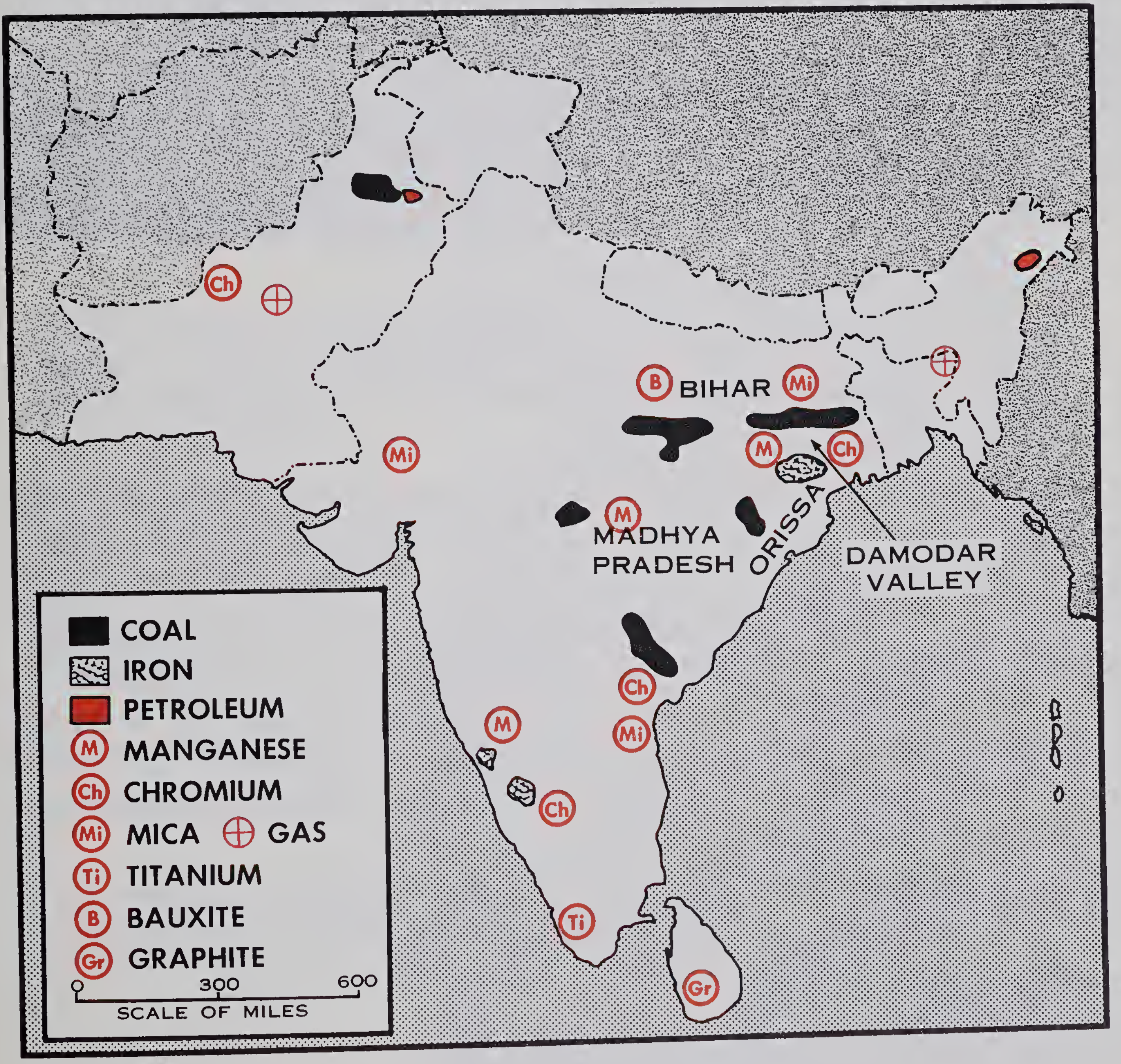
1. On an outline map of India, indicate by using the letter "I", the areas of the country which are irrigated.
2. Draw an agricultural products map of the Indian subcontinent. Include at least 10 crops.

MINERALS

Mining in India is relatively unimportant compared with agriculture; however, it plays a major part in the national economy and is providing the basis for industrialization. There are large coal reserves, especially in the Damodar Valley in the northeastern part of the peninsula. The country also has some of the largest reserves of iron ore in the world. Current iron ore output is about one-sixth that of Canada. India is one of the main sources of manganese, which is an ingredient of hard steel. The manganese is used in Indian steel mills and is also exported for use in the United States, Britain, and other Western countries. India produces three-fourths

Fig. 11

Map 6. Minerals.


BIHAR
MADHYA PRADESH
ORISSA
DAMODAR VALLEY
B
Mi
M
Ch
Ti
Gr
COAL
IRON
PETROLEUM
M MANGANESE
Ch CHROMIUM
Mi MICA
GAS
Ti TITANIUM
B BAUXITE
Gr GRAPHITE
0
300
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SCALE OF MILES

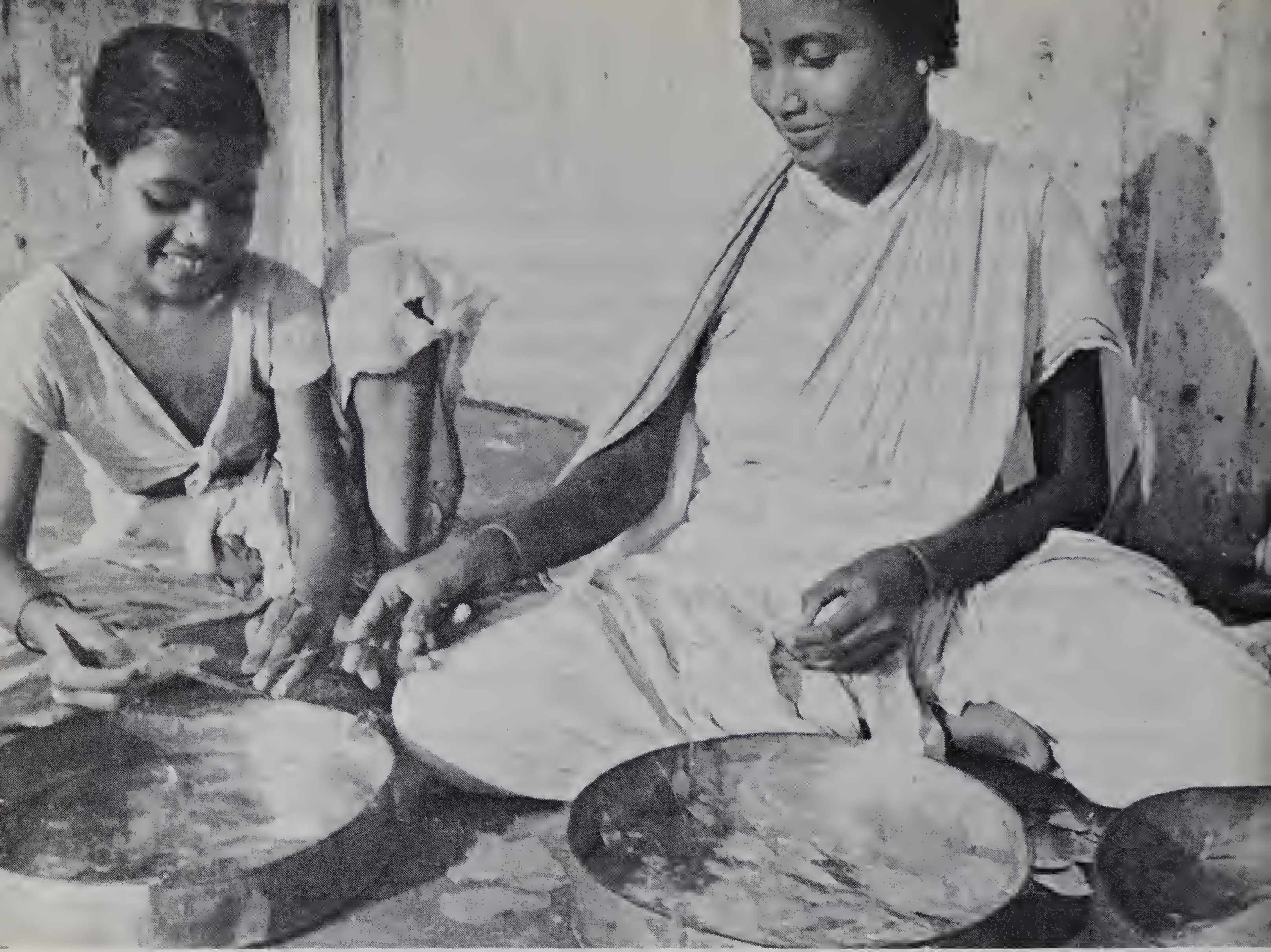


Figure 8. Mica Cutters at Work.
India is a leading world producer of mica, a valuable mineral that is used in the manufacture of such items as telephones, condensers, toasters, heating equipment, and roofing materials. Note the sign of caste on the foreheads of these Hindu women.

of the world's mica supply. Mica is important in the electrical and construction industries. Rich deposits of chromium, titanium, and bauxite are also found in India.

What little mineral wealth Pakistan has is located entirely in West Pakistan. Small deposits of coal and lignite yield less than a million tons a year, and there is virtually no production of iron ore or other metallic ores, except chromium. However, salt and gypsum are fairly important, and Pakistan has small but significant resources of oil and natural gas.

Compared with agriculture, Ceylonese mining is of minor importance. There is no coal or oil, but the gem stones and graphite of Ceylon are well known.

POWER

The Indian Subcontinent has a large hydro-electric power potential, but only about one-thirtieth of it has been developed. The most significant developments have been made by India. India has only small supplies of oil, but the large coal reserves in the Damodar Valley are used in thermal-electric plants that help supply power for the major industrial centres of Jamshedpur and Calcutta.

With foreign assistance, India is using her supplies of the atomic material, thorium, in nuclear power plants. Recently a reactor was built near Bombay as a joint project of Canada and India under the Colombo plan. Such nuclear developments place India ahead of most Asian countries in the atomic field. *Fig. 9*

Pakistan's small deposits of coal and oil and a large supply of natural gas in the west provide the energy for today's industries, but the greater part of the power for its expanding industries will be supplied by the numerous hydro-electric power stations recently completed or now under construction. In Ceylon, a major hydro-electric system has been developed on the Gal Oya River on the eastern flanks of the central hills.

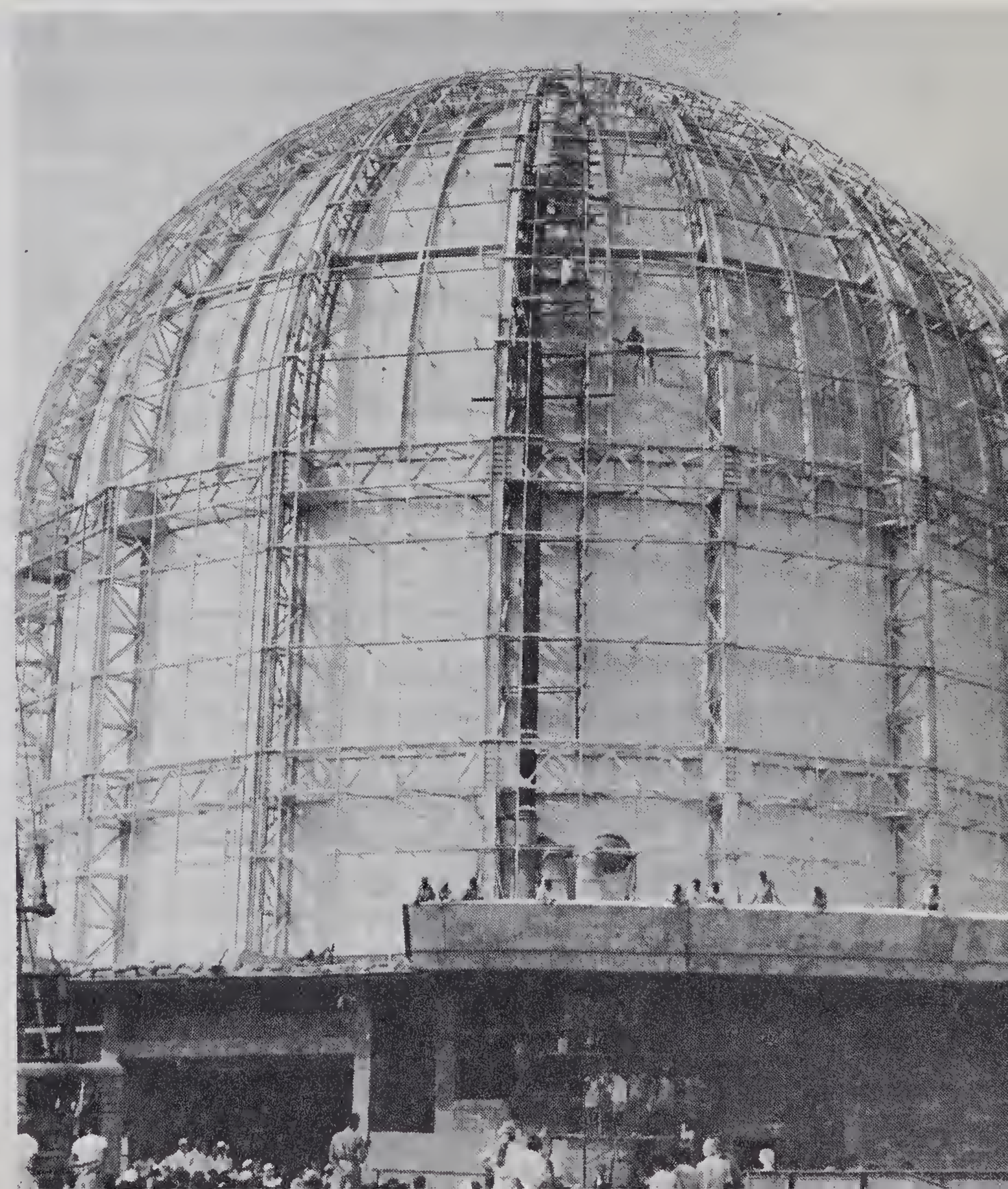


Figure 9. The Atomic Reactor at Trombay. *As a contributor to the Colombo Plan, Canada played a leading role in the construction of this reactor, which is located near Bombay.*

MANUFACTURING

The countries of South Asia are not highly industrialized, and industry and commerce employ only a small proportion of the *Fig. 8* workers. The industry is of two types: (1) cottage industries — old native handicrafts carried on without modern machinery in homes or in small workshops set up in the town bazaars, and (2) *Fig. 10* new industries carried on in factories with modern manufacturing machinery.

For centuries, cottage industries flourished in the rural villages in South Asia. Then the development of modern industries in Western countries during the last two centuries almost destroyed them. Inexpensive, mass-produced, machine-made goods from modern factories in the West drastically reduced sales of the fine, hand-made articles produced by skilled Indian craftsmen. As a result, the cottage industries declined. Only those crafts which produced pottery, heavy woodwork, and other goods too cheap or too heavy to bear ocean shipping costs remained important. However, the handloom industry still produces about 20 per cent of the nation's cloth and employs five times as many workers as all factories combined. Weaving silk, wool, and rugs by hand supports additional tens of thousands. India's craft industries still produce exquisite silver and brassware and lacquered goods for world markets. Handicrafts, to this day, engage far more workers than do the modern factories.

INDIA

Figs. 10 & 11 Cotton, jute, and iron and steel are India's only large-scale factory industries. Most factories are small plants that process the farm products grown nearby or produce building materials for local use. Typical activities in these numerous local industries are rice-milling, cotton-ginning, sugar-refining, oilseed-crushing, and the making of cement and bricks.

Cotton The cotton textile industry of India is scattered, but over one-half of all the mills are concentrated in Bombay and the Ahmadabad district. Madras and the Kanpur district are also important. The country is second only to the United States in the pro-

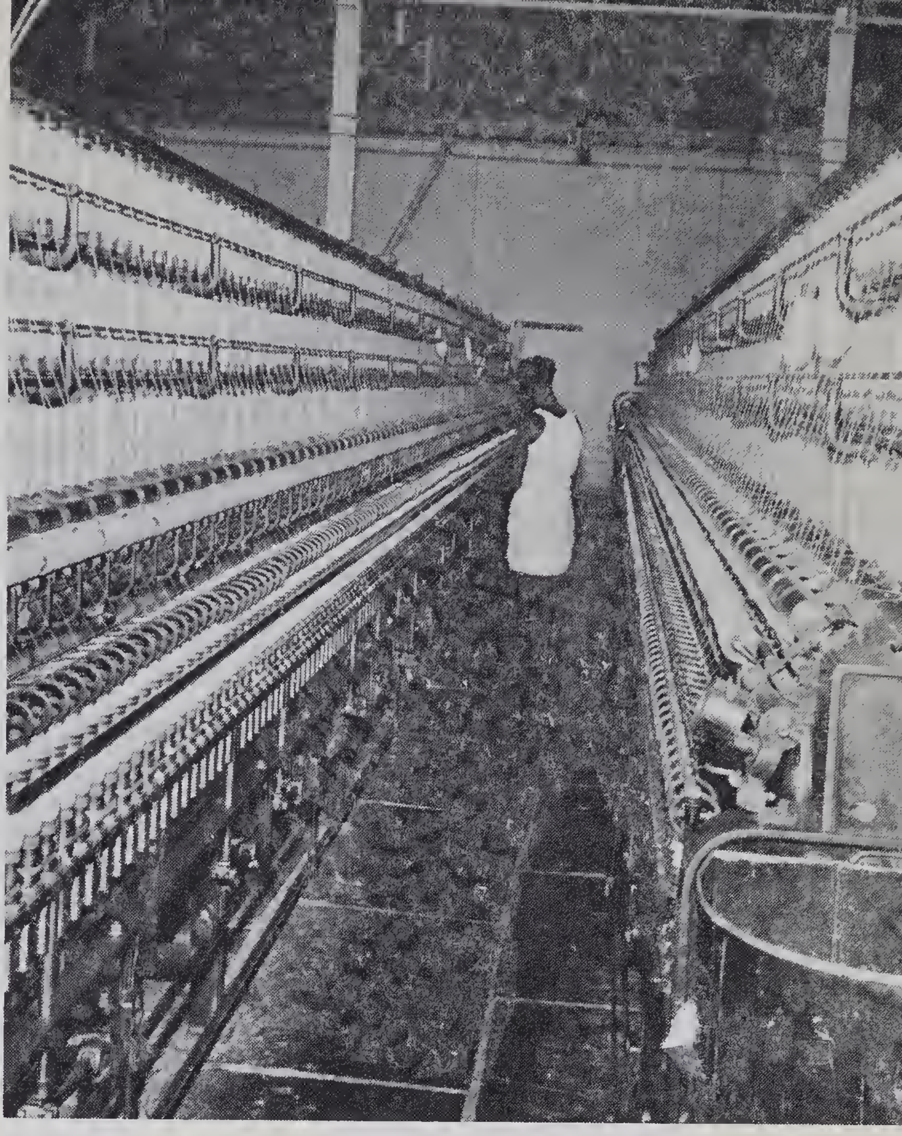


Figure 10. Spinning Cotton in an Indian Mill.
These huge spinning machines in a cotton mill in southern India contrast sharply with the simple equipment used in the many Indian homes that produce cotton textiles. Indeed, cottage industries still employ far more people than do large-scale industries like this cotton mill.

duction of cotton cloth and has become the world's leading exporter of that important textile.

Jute Jute manufacturing is concentrated in the Calcutta district along the Hooghly River. Jute products are of four main types: gunny bags for rice and wheat, burlap for baling cotton or wool, coarse rugs and carpets, and cordage and yarn.

Iron and steel The northeast section of the Indian Peninsula has varied resources for heavy industry, all conveniently grouped within a relatively small area. Coking coal from the Damodar Valley, high-grade iron ore from Orissa, and a range of ferroalloys, including manganese and chromium, can be brought together without heavy transportation costs. The Indian iron-and-steel industry has become concentrated in this area, and production is climbing steadily. The Jamshedpur mill, 150 miles west of Calcutta, is one of the largest in the Commonwealth. Numerous industries that require steel as a raw material have also been attracted to the district. Russia, Britain, and Germany each have built steel plants for the Indian government, and other plants are planned.

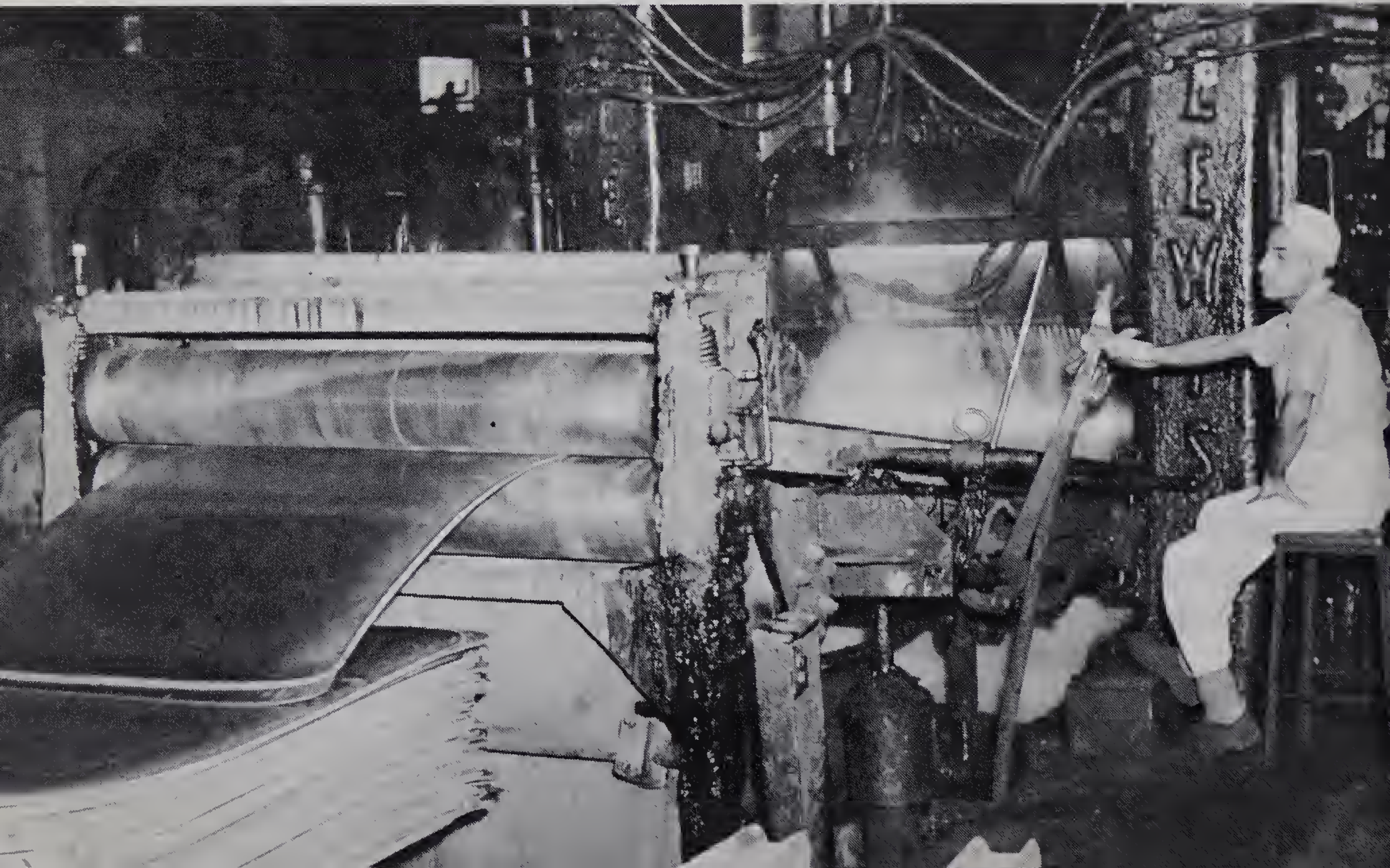
Fig. 11

PAKISTAN

Pakistan has a far poorer base for heavy industries than does India, although the natural gas in West Pakistan offers sufficient fuel for power-driven industries for many years. Before Partition, large industries were limited to several cement and flour mills and two petroleum refineries. Cottage industries were much better developed. Since Partition, major advances have been made. Cotton mills are being developed rapidly, several woollen mills have been built in the west, and numerous jute mills have been constructed in the east. Steel mills have been set up at Lahore and Karachi. Rolling mills and engineering industries have been established in the west, and several sugar mills, chemical plants, paper mills, and other plants have been constructed.

Despite these impressive advances, Pakistan is still far from being industrialized. Only two out of every ten workers are employed in industry and commerce, and the manufacturing of textiles is the only significant industry.

Figure 11. Inside an Indian Steel Mill.
Sheets of red-hot metal are seen here coming out of the rollers. Rich in both coal and iron ore, India is rapidly expanding its iron and steel industries.



CEYLON

Ceylon has few industries, apart from those engaged in the processing of its agricultural products — the drying and blending of tea, the manufacture of crepe rubber from latex, and the extraction of coconut oil from copra.

PROBLEMS

Several of the numerous problems of South Asian lands have already been described. They include:

Overpopulation: the subcontinent has many natural resources, but they must support more people than the combined populations of the continents of Africa, North America, and Australia. The benefits from improvements being made in the use of its natural resources are absorbed by an annual population increase (births minus deaths) of about 10 million people every year. Thus, South Asia adds more people to its population every two years than live in all of Canada.

Underprivileged masses: the great majority of the people of South Asia are poor, under-fed, illiterate, and ill-housed. Many are unable to obtain continous employment.

Overdependence upon agriculture: too many people are trying to earn a living by crude methods from the tiny, overworked farms of the rural plains of India and Pakistan.

Figs. 4 & 7

Disease: lack of proper sanitation, ignorance of personal hygiene, and a shortage of doctors, nurses, and medical facilities make chronic illnesses and early death commonplace.

Religious taboos and conflicts: many Hindu beliefs, such as holding the cow sacred and adhering to the caste system, are serious handicaps to economic progress. Antagonism between the many religious groups often leads to bitterness and even bloodshed.

p. 216

An unnatural division of the subcontinent: division of the South Asian mainland on the basis of religion defies all geographical common sense. A dispute over the possession of Kashmir has caused bitter feelings between Pakisan and India for several years.

Map 1

Communism: the glowing promises of Communist agitators appeal to many of the depressed of the subcontinent. Russia is

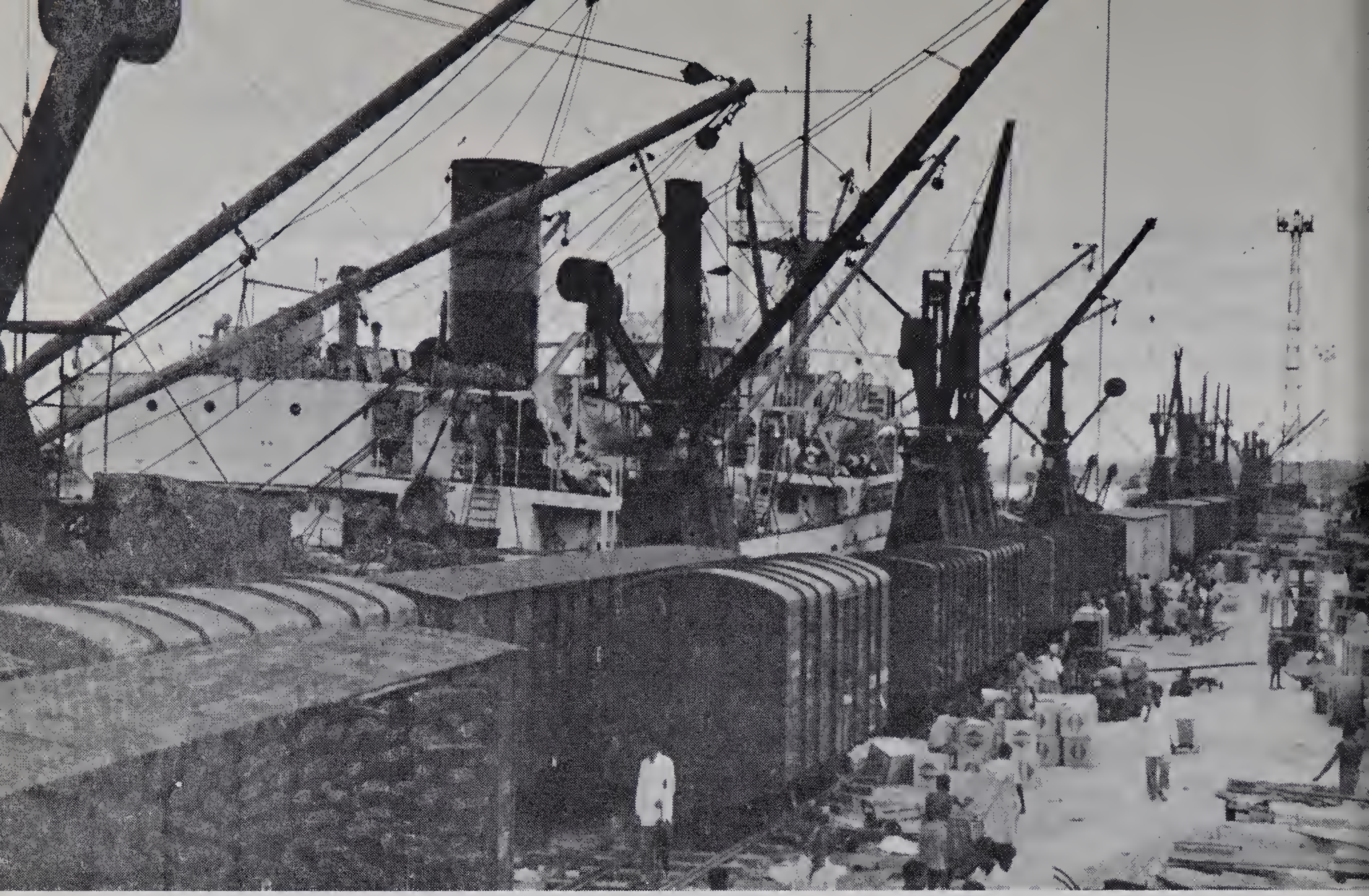


Figure 12. A Port Scene in Karachi, West Pakistan.
Karachi is the chief port and largest city of West Pakistan. Railways extend from Karachi up the Indus Valley and across northern India to East Pakistan. Goods arriving from all parts of Pakistan are transferred to ships at Karachi's busy docks for export abroad.

wooing India with technical and financial aid, and Indian Communists have already won an election in one of the country's provinces. Communist China has seized sections of India's northern borderlands.

Inadequate transportation facilities: roads are poor and many of them are impassable in the rainy season. Good harbours are scarce, and most rivers are useless for navigation. Local air transport is inadequate. Only rail communication has been well developed. Excellent railways, constructed during British rule, provide good connections between major cities.

Floods and droughts: the monsoon rains often cause floods that destroy property and drown thousands. On the other hand, when the monsoon rains fail to arrive at the usual time or fall in insufficient amounts, they cause droughts that result in widespread crop failures and famine. *p. 209*

Inadequate and underdeveloped forest, mineral, and power resources: almost all large, accessible forests of commercial value have been destroyed, and most of the inhabitants cannot afford to buy wood, oil, or coal for fuel. Pakistan and Ceylon are without most of the essential minerals, and India lacks several minerals necessary for modern diversified industry. A shortage of trained technicians and engineers and lack of domestic capital is hindering the development of the mineral deposits and power resources that do exist.

SUMMARY

Because of its huge population, the Indian Subcontinent is assuming a prominent place in the affairs of the world. As members of the Commonwealth, India, Pakistan, and Ceylon usually support Western reaction to Communist activities, but these new Asian democracies proudly maintain their right to disagree when they believe Western policies are wrong. Despite billions of dollars in foreign aid and ambitious government development programmes, the conditions under which most of the people live have changed little since ancient times. The gigantic task of modernizing the subcontinent has only begun.

WORK UNIT —

The Language of Geography Add to your reference list definitions for the following terms: technical assistance, mica, manganese, cottage industries.

Problems and Projects

1. Compare India's present-day cottage industries with England's cottage industries of 150 years ago. In what way are they similar? In what way are they different?
2. Compare India's mineral products with Canada's mineral products under the following headings: (1) products mined; (2) mining techniques; (3) importance to nation's economy.
3. Why are western countries assisting India's economic development?
4. List the problems affecting the people of the Indian subcontinent.
5. If you were a government leader in India, how would you solve two of the above problems?

REVIEW QUIZ—INDIA

Most of the statements below are FALSE, but a few are TRUE. Copy the TRUE statements into your notebook. Make the FALSE statements TRUE by adjusting the underlined section of each statement.

1. The Indian subcontinent stretches from 6° to 37° N latitude, a distance of about 1,000 miles.
2. The Indian subcontinent is about one-half the area of Canada.
3. Pakistan is divided by about 1,000 miles of India's territory.
4. Although most of the people of India are Hindu, about 20,000 Moslems live in India.
5. The three most important rivers of India and Pakistan are the Ganges, Indus, and Irrawaddy.
6. The Indian subcontinent is divided into four climatic regions.
7. The Wet Monsoon Season begins in November and ends in January.
8. Monsoons are caused by ocean currents which change direction with the seasons.
9. One-third of the world's people live on the Indian subcontinent.
10. Urdu is the official language of India.
11. The Moslem religion recognizes many gods, but the Hindu religion acknowledges only one god.
12. The caste system of India is gradually disappearing.
13. Three-quarters of India's people live in villages.
14. Delhi, Calcutta, and Madras are the three largest cities of India.
15. Calcutta is the chief commercial centre of India.
16. Karachi is the capital of Pakistan.
17. India ranks fourth in the amount of arable land in the world.
18. Three of Pakistan's leading products are jute, cotton, and cocoa.
19. Much jute is cultivated on the Ganges-Brahmaputra lowlands.
20. Almost three-quarters of the delta land in India is planted in rice.
21. Millions of acres of land are irrigated in the middle and upper Ganges Valley.
22. The Punjab area has black soils that resemble central Alberta soils.
23. The interior Deccan is a traditional famine zone.
24. Most of the people of Ceylon live in the dry coastal area.
25. The chief crop of Ceylon is tea.
26. Pakistan is the world's foremost supplier of jute.
27. India ranks first and Pakistan second in world cattle population.

28. Excessive subdivision of arable land into tiny farms is a problem only in Ceylon.
29. The Colombo Plan is designed to assist the people of Ceylon.
30. Winnowing is a method of fertilizing grain.
31. A barrage is an irrigation canal.
32. The bark of the cinchona tree yields quinine.
33. Sandalwood is produced in the drier parts of India.
34. India has some of the largest reserves of copper in the world.
35. India produces about six times as much iron ore as Canada.
36. Three-quarters of the world's supply of mica is produced in India.
37. Manganese is used in the hardening of aluminum.
38. India has refused all assistance in the development of atomic, thermo-nuclear power plants.
39. Most of India's cotton mills are concentrated in the Calcutta and Bombay areas.
40. Russia, Britain, and Canada have built steel plants for the Indian government.
41. Pakistan uses much natural gas for power.
42. Pakistan's cottage industries are not as well developed as India's.
43. One-fifth of Pakistan's workers are employed in industry or commerce.
44. The population of the Indian subcontinent increases by about 10,000,000 persons each year.
45. India and Ceylon cannot agree on the ownership of Kashmir province.
46. Good harbours are scarce in the Indian subcontinent.
47. Railway communication between the major cities of India is generally good.
48. Almost all of India's accessible commercial forests have been destroyed.
49. India always supports the Western world in international affairs.
50. A shortage of construction labour is hindering development of mineral deposits and power installations in India.

The Commonwealth in Southeast Asia: Malaysia

Several states of Southeast Asia may unite to form the Federation
Map 1 of Malaysia. The merging states are Malaya, Singapore, and British Borneo. Malaya became an independent member of the Commonwealth in 1957. Singapore is a self-governing British colony. British Borneo consists of the crown colonies of North Borneo and Sarawak and the Protectorate of Brunei.

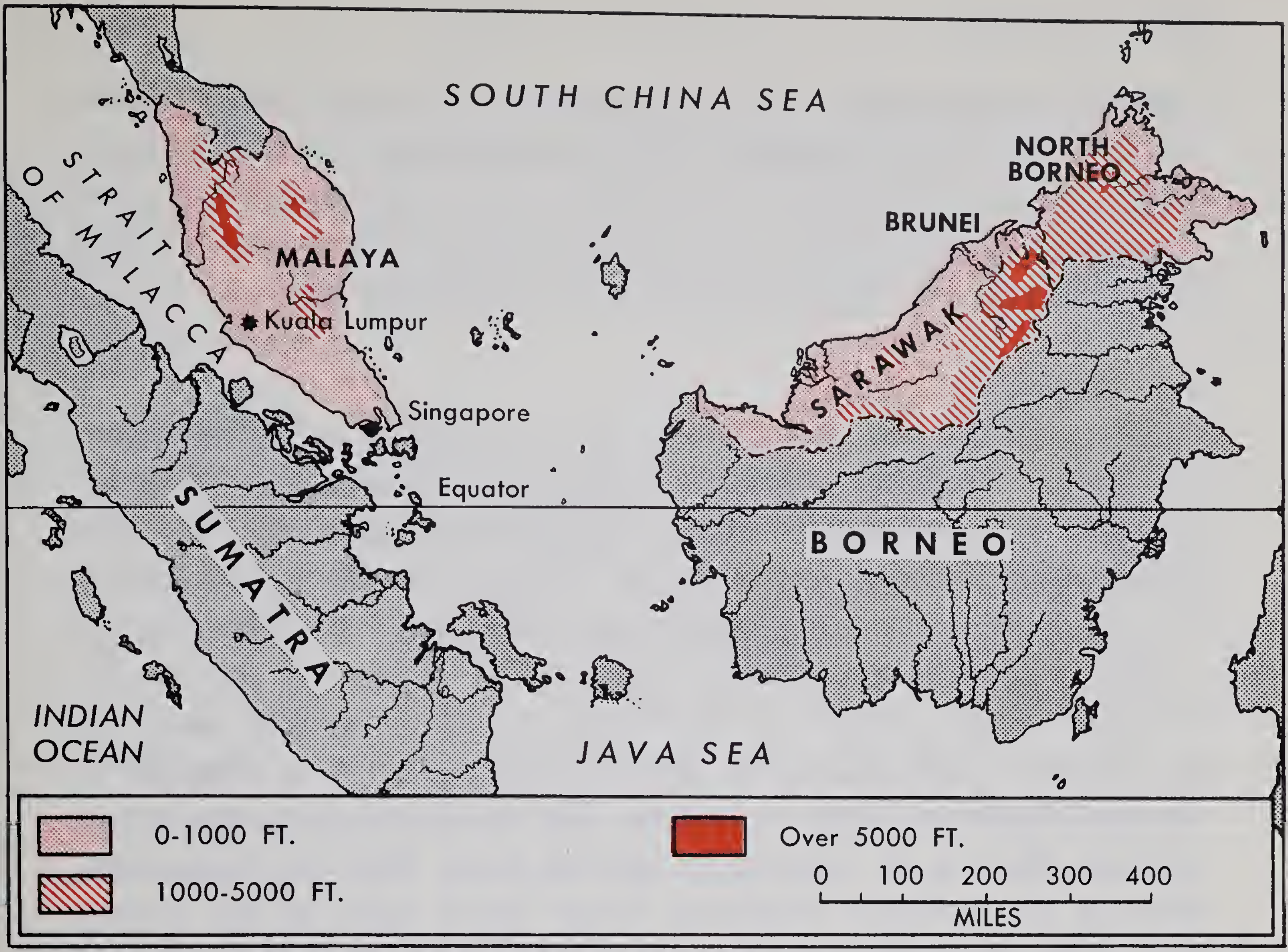
Malaya and Singapore together occupy the southern half of the
Map 2 Malay Peninsula, the most southerly projection of the Asian mainland. British Borneo comprises the northern section of the large island of Borneo in the Indonesian Archipelago. Sharing the island with British Borneo is the independent Republic of Indonesia. The mainland and island sections of the proposed Federation form a crescent-shaped arc extending from 1° to 8° north of the equator.

MALAYA

The area of Malaya is slightly more than 50,000 square miles; it is about the same size as England and less than one-fifth the size of Alberta. Its section of the Malayan Peninsula is almost 500 miles long and about 200 miles in width at its widest point.

SURFACE, DRAINAGE, AND COASTS

The surface of Malaya is dominated by numerous mountain ranges that run roughly north and south. Although generally less than 7,000 feet high, these ranges are sufficiently steep and rugged


SOUTH CHINA SEA
STRAIT OF MALACCA
MALAYA
Kuala Lumpur
Singapore
Equator
SUMATRA
INDIAN OCEAN
JAVA SEA
NORTH BORNEO
BRUNEI
SARAWAK
BORNEO
0-1000 FT.
1000-5000 FT.
Over 5000 FT.
0 100 200 300 400
MILES

Map 1. Malaysia: Location and Landforms.

to discourage settlement and to make east-west travel difficult. Because of the rugged nature of the peninsula, most of the settlement is concentrated on a narrow western lowland bordering the Strait of Malacca. Averaging about 50 miles in width, this western lowland contains most of the cultivated land and supports most of the 7 million inhabitants.

The heavy rainfall of Malaya feeds hundreds of rivers on both sides of the dividing mountain ranges. Most of the rivers are short, the longest being the east-flowing Pahang which is only about 200 miles in length. The Perak is the largest river flowing to the west coast. At the mouths of the west-flowing rivers are thick mangrove swamps, consisting of tropical aquatic trees with many roots that grow in the air rather than underground or in the water. On the east coast, the large waves of the South China Sea reduce the number of mangrove swamps. Here are found extensive sandy beaches, broken by occasional rocky capes. In contrast, the west

Map 2

coast has comparatively few sandy beaches. There are many islands off the coast of the peninsula, the most important being Singapore to the south and Penang off the west coast. A shortage of good anchorages along the flat, swampy coasts greatly increases the value of the excellent harbours of Singapore and Penang.

CLIMATE

Malaya has a hot, wet climate. The average annual temperature for most places on the lowlands is about 80°F., and the difference between the warmest and coolest months is usually less than five degrees. The interior highlands are cooler than the lowlands, but none of the ranges is high enough to have really cold weather.

The average yearly rainfall exceeds 90 inches on the coastal lowlands. Even greater amounts fall in many highland areas of the interior. Like the Indian Subcontinent, Malaya is affected by the vast Southeast Asian monsoons. The southwest monsoon brings western Malaya its maximum rainfall from May to September, whereas the northeast monsoon brings heavy rains to the eastern part of the peninsula from October to February. However, no part of the peninsula has a true dry season because the interior ranges are too low to create an effective rainshadow.

pp. 210 & 211

NATURAL VEGETATION AND FORESTRY

The hot, wet climate has created dense tropical rainforests that cover three-quarters of Malaya. These equatorial forests consist of a mixture of a large number of tree species, mainly of the broad-leaved evergreen type. The spreading branches of giant trees form a canopy above the dimly lit forest floor. Tree trunks are hung with climbing vines and with hundreds of species of orchids and other flowers, including the largest known flower, the Rafflesia arnoldi, which is as much as 18 inches wide. Almost impenetrable mangrove swamp forests thrive along the poorly drained coastal fringes, especially in the west, and coconut palms are numerous along the sandy beaches.

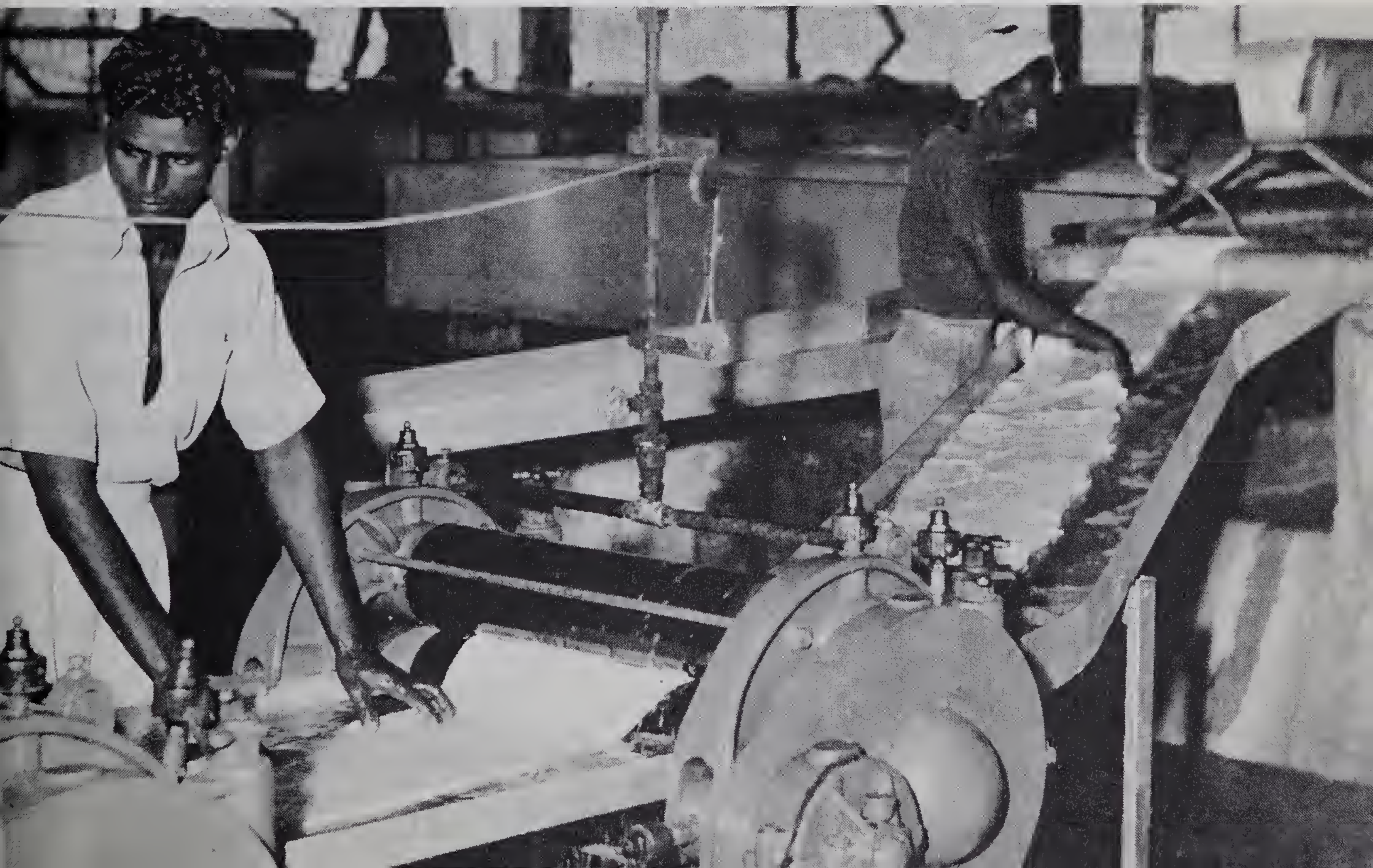
Valuable products from the forests include excellent hardwood timber, rattans, firewood, coconuts, rubber, and palm oil. The tropical hardwoods are sandalwood, mahogany, and several other woods ideal for cabinet work and interior finishing. The rattans are vines with long, tough, ropelike stems used to make furniture and other types of wickerwork. Bamboo, which is actually a woody variety of grass, is used by the rural people for building houses and river rafts. *Fig. 4*

AGRICULTURE

Farming is the chief occupation and main source of income in Malaya. Although the tropical soils of Malaya are not rich in plant foods, they do support the growth of many valuable tree crops, including rubber, coconuts, oil palms, and tropical fruits. Because of its rough surface and poor soils, only 17 per cent of the country is under cultivation. *Fig. 2* *Map 2*

Rubber Malaya is surpassed only by Indonesia as a producer of natural rubber. Rubber trees occupy two-thirds of the country's cultivated land and produce the main cash crop and principal

Figure 1. Manufacturing Rubber in Malaya.
The picture shows congealed rubber being floated along a chute on the way to the rollers, where it will be pressed into sheets. Malaya is the world's leading producers of natural rubber. Mechanized processing like this is common only on large estates.



export. Natural rubber can be obtained from several plants, but the best source is the *hevea* tree, which originated in the tropical rainforests of South America. Introduced to Malaya near the end of the 19th century, the rubber tree soon became the main source of cash crops. *Map 2*

Several factors contributed to the rapid development of rubber plantations in Malaya. These included (1) all of the natural conditions needed to grow hevea trees: heavy rainfall, well-drained land, and year-round warmth; (2) good shipping facilities; (3) a large supply of cheap and efficient labour to work on the plantations; and (4) the presence of European settlers and investors who were willing to spend their time and risk their money in the development of large rubber plantations.

Rubber is the solidified form of *latex*, a milky liquid that develops in the tissues located next to the outer bark of hevea trees. The latex is harvested by a process called tapping. The process consists of making a cut in the trunk of the tree to tap the latex-bearing tissues and collecting the milky liquid in a container as it flows from the tree. The latex is then gathered and poured into large vats. Natural acids mixed with the latex cause it to coagulate into solid form. The rubber is then dried and pressed into sheets for shipment. In recent years, much of the latex has been shipped in *Fig. 1* a liquid state for use in the making of foam rubber and other new rubber products. Hevea trees require six to ten years to mature before they are ready for tapping. The saplings are first planted in nursery beds and later transplanted to a permanent location.

Small-scale native growers have increased their holdings since Malaya gained its independence. Forty per cent of the total rubber output is now produced on small native holdings, where the farmer and his family do all the work by hand. In contrast, many of the operations on the big plantations have been mechanized.

Other Cash Crops Numerous palm trees also provide valuable products for export. The two most useful types of palm trees are coconut palms and oil palms. Coconut groves are found chiefly on the sandy coastal plains, while many oil palms have been planted in rubber plantations to provide shade for young rubber

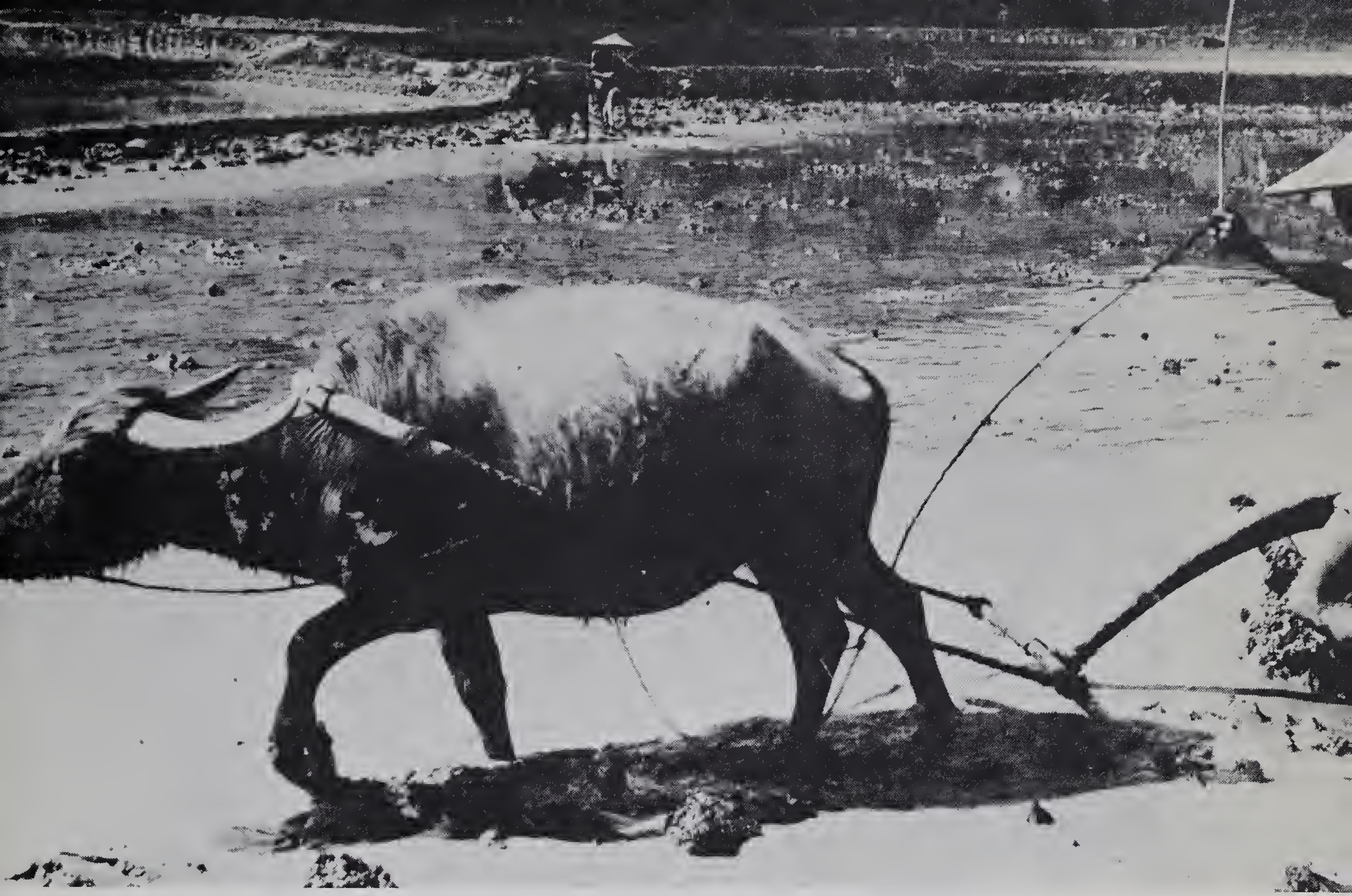


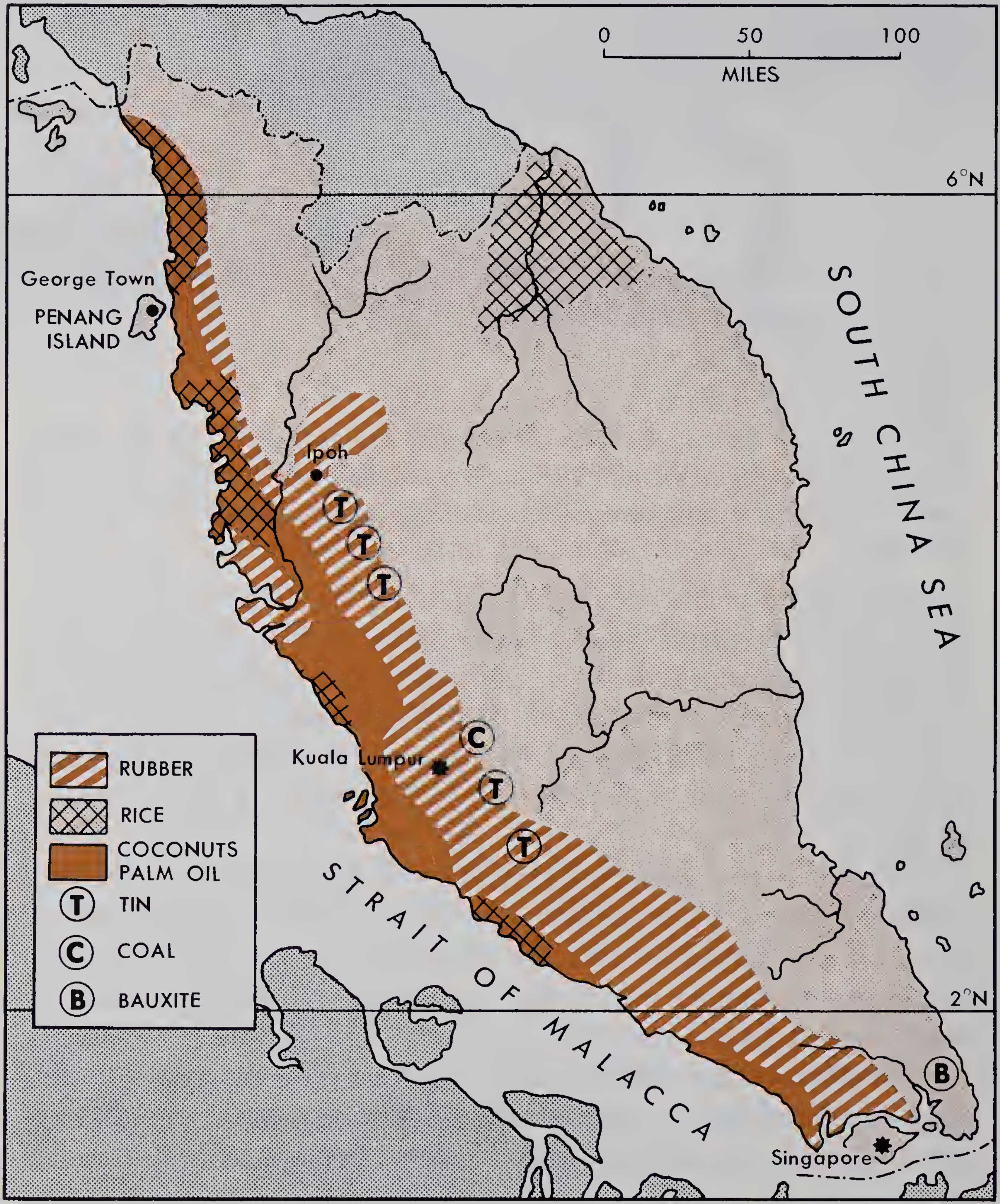
Figure 2. Ploughing with a Water Buffalo.
Before rice is planted, the flooded paddies are ploughed. All the labour is performed without benefit of modern machinery. Describe the equipment being used by the farmer and the difficulties he faces in performing this task.

trees. The fruit of the coconut has an outer husk and a central nut. When dried, this fruit yields copra, a food rich in oil and protein. If crushed, the copra yields an oil used in the making of soap and margarine. A useful fibre known as coir is obtained from the husk: it is often woven into matting. The shells of coconuts can be made into a fine charcoal, which is commonly used as a fuel by native Malayans.

Oil palm trees produce large clusters of fruits that yield oil from both their fibrous pulp and from the nut-like kernels in their centre. Palm oil is obtained by cooking and pressing the fruit. Most of it is shipped in tankers to Europe and North America, where it is used in the manufacture of soap and margarine.

Other Crops Rice is Malaya's chief food crop and ranks second only to rubber among farm products. However, the rice crop supplies only about two-fifths of the country's needs, and large imports of food are necessary. The rice is grown chiefly on flat alluvial lands, which are most extensive on the west coast lowlands and in the extreme Northeast. Most of the rice is grown by native Malays on flooded fields, called paddies. Wooden ploughs pulled by water buffaloes are normally used to cultivate the paddies. About 5 per *Fig. 2*

Map 2. Malaya and Singapore: Products.


0
50
100
MILES
6°N
2°N
George Town
PENANG ISLAND
Ipoh
Kuala Lumpur
Singapore
SOUTH CHINA SEA
STRAIT OF MALACCA
RUBBER
RICE
COCONUTS PALM OIL
T TIN
C COAL
B BAUXITE
T
C
B

cent of the rice crop is upland-rice, or dry-rice, which is grown on unflooded land in the hilly interior. The second most important food crop is tapioca, which is obtained from the nutritious starch of the rootstocks of the cassava plant. Also grown for food are sweet potatoes, corn, peanuts, sugar cane, and many types of tropical fruits. Pineapples are an important export item.

Shifting Cultivation A crude type of farming, called *shifting cultivation,* is practised by the primitive tribesmen of the interior. Clearings in the forest are first made by cutting the underbrush and removing the lower branches of the trees. The trees are then killed by girdling, which is cutting a deep gash around the trunk. When the dead trees are dried out, they are burned. Their ashes fertilize the otherwise poor tropical soils, so that the farmer is able to grow his crop. Usually the soil is not ploughed; in most cases the seed is planted in shallow holes made with a crude digging stick. Typical crops include dry-rice, sweet potatoes, and tapioca. After two or three crops have been grown, weeds choke out the crops, and the plot is abandoned. Within a few years, trees again cover the former clearing, offering a fresh supply of fertilizer and controlling weed growth with their shade. At this time, the shifting cultivator returns to repeat the cycle of cutting, girdling, burning, primitive planting, followed by weed invasion, and abandonment to the forest.

FISHERIES

Fishing is the principal non-agricultural occupation of the Malayan people. Most of the catch is landed by native Malays who fish all along the 12,000-mile coastline, usually within 30 miles of the shore. Fresh-water fisheries contribute about one-quarter of the total catch. Fish is the best source of protein in the regular Malayan diet. As well as doing their tasks on the fishing grounds, many of the fishermen spend part of their time as farmers.

MINERALS

Malaya produces about a quarter of the world's output of tin. The best deposits of this comparatively rare and useful metal occur

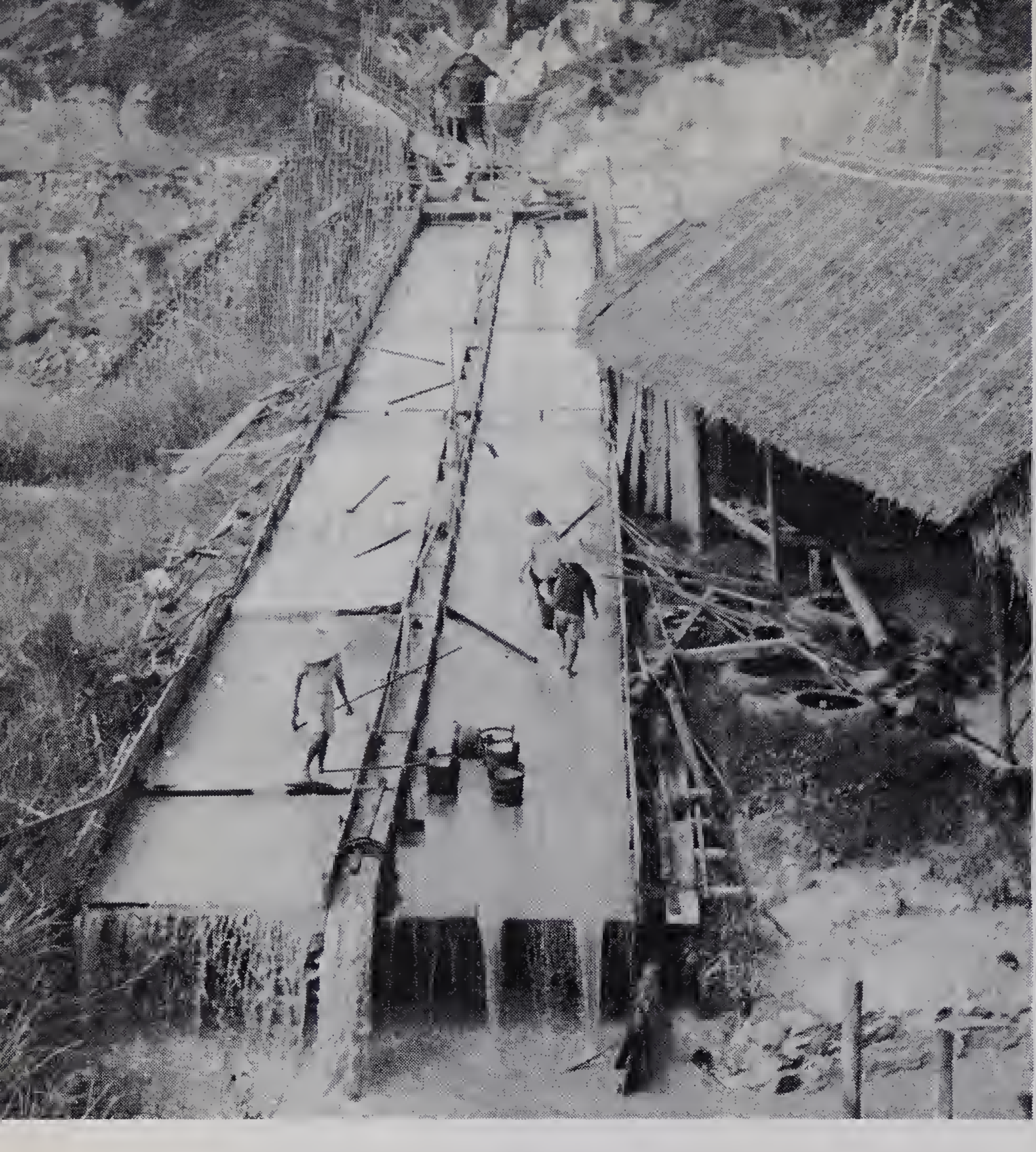


Figure 3. Malayan Tin-gravel Pump.
This wide wooden channel, called a palang, is used to separate tin ore from sand and gravel, by means of a regulated flow of water. Wooden bars, at intervals, retain the tin ore left when the lighter material is washed off. Coolies are here collecting the tin deposits. Most of the wooden bars have been removed during the collection.

Map 2 in the gravel beds of streams flowing through the western foothills. In the 15th century, Chinese immigrants began working Malayan tin by a method called "panning". Now only small amounts of tin are obtained by panning, most of it being mined by either of *Fig. 3* two placer mining methods; (1) by dredging the tin-bearing alluvial materials and using powerful streams of water to wash the gravels and sands away from the comparatively heavy metal, or (2) by using pumped water, without any dredging, to obtain the ore from the gravel and sands. The dredging system is more efficient, but is more costly. It is used by European-owned companies, which use much expensive equipment to produce about 60 per cent of the Malayan tin output. The cheaper and simpler hydraulic gravel pump method is used by smaller operators, who are mainly Chinese. About four-fifths of the country's miners are Chinese, since they make up the majority of the work force for both the European- and Chinese-owned concerns. After being mined, the tin-bearing ores are shipped for processing to the great smelters in Penang and Singapore.

Only small amounts of other minerals are produced. They include iron ore, bauxite, coal, and gold.

POWER AND MANUFACTURING

Large-scale industry plays a minor role in the economy of Malaya. The available resources of coal, iron ore, and other essential minerals are inadequate to support large-scale industrialization. In addition, the people of Malaya are not rich enough to buy a wide range of manufactured goods. Thus, the manufacture of consumer goods is limited to making cheaper products, such as textiles, soap, matches, and footwear. As would be expected, the major industries are tin smelting and the processing of rubber.

Although most of the urban areas are supplied with electricity, there is insufficient power generated to encourage the growth of large-scale manufacturing industries. Coal and oil are burned in a few places to produce thermal power, but these fuels are in short supply since Malaya has no productive oilfields and only limited supplies of low-grade coal. However, an attempt is being made to increase the number of hydro-electric developments, which at present are neither large nor numerous.

THE PEOPLE

Malaya has a population of 7 million and a density of 131 persons per square mile. Thus, it is much more densely peopled than Canada with our density of only 5 per square mile but much less densely populated than India with its 346 persons per square mile or the United Kingdom with 575. Of the various racial groups living in Malaya, the largest are Malays, Chinese, Indians, and Pakistanis.

The Malays are short in stature, light-brown skinned, good-natured, and polite. They speak a distinctive language called Malay and write with an arabic script. They are strong supporters of their Moslem religion and are loyal to their traditional rulers. Most of them are subsistence farmers and fishermen.

Most of the large Chinese population are descendants of immigrants brought to Malaya from southern China by the British to work in the country's rich tin mines. Unlike the Malays, the Chinese generally avoid farm work, choosing rather to engage in business and trade. They own most of the business enterprises; their plantations produce more than half of the country's rubber; and their mining operations produce about one-third of Malaya's output of tin. The Chinese are also the country's wholesalers, storekeepers, and money-lenders. Their economic influence is, therefore, greater than that of any other racial group. Tension between the industrious Chinese and the less energetic Malays has long been a major problem. Differences in culture and religion increase the tension between the two groups, since the Chinese normally retain the Buddhist religion, ancient philosophies, manners, and customs of China.

When the British were developing the large rubber plantations, they brought in large numbers of immigrants from India to work on the plantations, because most Malays were unwilling to change their easy-going traditional way of life. The majority of the Indians are Hindus, but there are also many Moslems. However, since the partition of British India into Hindu India and Moslem Pakistan, the Moslem Indians of Malaya should now be thought of as Pakistanis.

In addition to the three largest racial groups, there are about 60,000 Europeans, 50,000 primitive tribesmen, 34,000 Eurasians, and 14,000 others. The more open parts of the rainforest region of the interior are thinly populated by the original inhabitants (aborigines) of Malaya, who live by hunting, trapping, fishing, gathering edible roots, fruits, and berries, as well as by practising shifting cultivation. These primitive tribesmen are usually animists, who believe that mountains, trees, and other natural objects contain spirits.

Although Malaya has a system of free and compulsory education, many of the people are still unable to read and write, especially in the rural areas. There are separate elementary schools for each of the main language groups, but only limited facilities for secondary and higher levels of education are available.

URBAN DEVELOPMENT

Because of the lack of industrialization in Malaya, there are few large cities, considering the size of the population. The bigger cities are all government headquarters, commercial and trade centres, or ports. The growth of Malayan cities is also limited by the role played by the great port of Singapore in the trade and business of the Malay Peninsula. Only Kuala Lumpur and George Town exceed 200,000 in population.

Map 2

Kuala Lumpur (477,000) is the capital of Malaya. A beautiful city with fine buildings and roads, it serves the tin-mining and rubber-growing areas that surround it. Located on the trunk railroad line of western Malaya, about 250 miles by rail from Singapore, Kuala Lumpur is a junction centre for an important spur line to the seaport town of Port Swettenham. Picturesquely situated on the northeast coast of Penang Island, *George Town* (339,000) attracts many curious tourists. As a port serving the Malay Peninsula, it is surpassed only by the great seaport of Singapore. George Town gathers and trans-ships large quantities of rubber produced in western Malaya, as well as smelting and handling much of the country's tin exports. In addition to its tin smelters, the city has factories that mill rice, remove oil from coconuts, and process pineapple and other fruits. The majority of George Town's citizens are Chinese.

TRANSPORTATION AND TRADE

By Asian standards, Malaya has a good network of railways and roads, which is best developed along the west coast. Many small Malayan vessels are engaged in coastal shipping, serving ports throughout Southeast Asia and carrying a large part of Malaya's freight and passenger business. Since the mouths of most Malayan rivers are blocked by sand bars and/or mangrove swamps, river shipping is unimportant. Good air services link all the major cities, and Singapore is served by several of the world's principal airlines.

Rubber and tin are the leading exports of Malaya; together they represent almost 90 per cent of the country's sales abroad. Rice, other foodstuffs, and manufactured goods are the principal imports. Thailand, Burma, and South Vietnam supply the bulk of Malaya's rice requirements. Malaya purchases most of the manufactured items it needs from the industrial nations that buy Malayan rubber and tin. One of these countries is Canada.

WORK UNIT —

The Language of Geography Add to your reference list, definitions for the following terms: coir, latex, Rafflesia, hevea, cassava, girdling, placer mining, shifting cultivation.

Problems and Projects

1. The average annual temperature for most places in Malaya's lowlands is about 80°F. Compare this with your nearest city's average annual temperature. Account for the difference.
2. In what ways is the vegetation in your province different from Malaya's vegetation? Are there any similarities in the type of vegetation?
3. List at least ten uses to which rubber is put in your home.
4. Suggest several reasons why Malaya must import great quantities of rice.
5. Much of Malaya's tin ore is shipped to Singapore where it is refined or smelted. What are the advantages of shipping it to Singapore? What would be the advantages of having it refined in Malaya?
6. What is the most important factor which contributed to the development of Malaya's rubber industry?
7. Why are there so few cities in Malaya?

Maps

Construct a products map of Malaya. Illustrate your products by using such things as tin foil to illustrate tin and rubber bands to illustrate rubber resources.

SINGAPORE

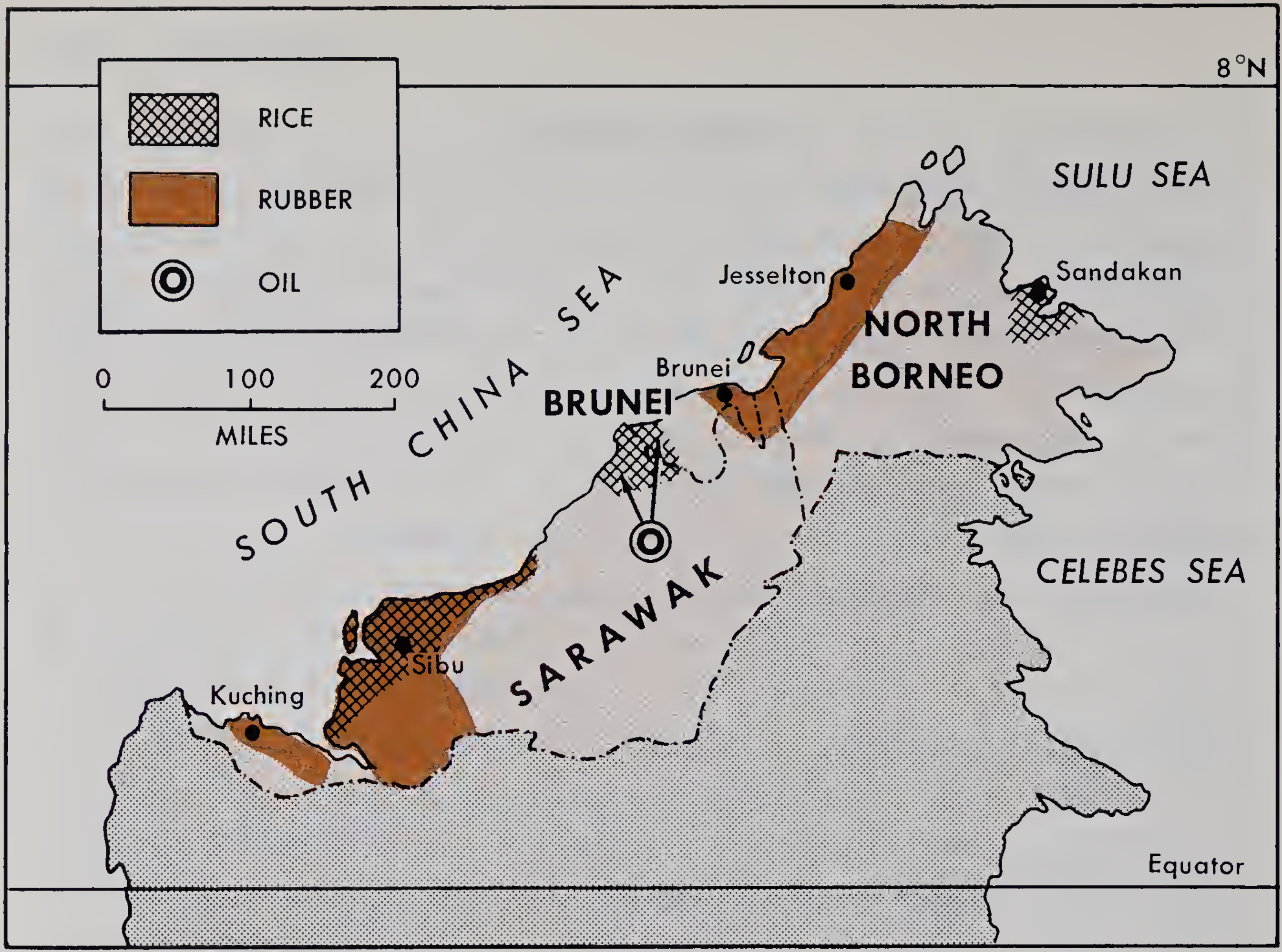
Its strategic location explains the growth and importance of Singapore. The island and its great city of the same name are located beside the narrowest part of the Strait of Malacca, which provides the best sea route between Europe and the Far East. Guarding this vital sea route, Singapore is the chief British naval base in Asia and is an important SEATO (South-East Asia Treaty Organization) base for the fight against Communist expansion in southern Asia. *Map 2*

Singapore is also one of the world's greatest seaports and a major trade and trans-shipment centre (or entrepôt). Singapore's growth has been stimulated by its fine harbour and its strategic location on a major world trading route. As the principal entrepôt for southern Asia, it handles the exports of Malaya and Indonesia and gathers many products for further processing and trans-shipment to other parts of the world. Tin concentrates, rubber, copra, palm oil, lumber, and spices are some of the products assembled here. Singapore is also a distribution centre for European and American goods bound for the consumers of Asia. As the major port for Malaya, it imports rice, textiles, and other goods needed by Malayans, whose emphasis on crops for export leaves them short of food and other essential items.

About two-thirds of the 1½ million inhabitants are concentrated in the great seaport city of Singapore. More than three-quarters of the people are of Chinese origin; only twelve per cent are Malays. The crowded 224-square-mile island has a population density of more than 6,000 persons per square mile!

BRITISH BORNEO

The combined area of the states making up British Borneo is 80,000 square miles. This island section of the planned federation is, therefore, half again as large as the mainland section. However, the population and population density of British Borneo are very small compared with those of Malaya and Singapore. British Borneo has only 1,300,000 inhabitants and an average density of 16 persons per square mile. Singapore, with an area of only 224 *Map 3*


RICE
RUBBER
OIL
0
100
200
MILES
8°N
SULU SEA
Jesselton
Sandakan
NORTH BORNEO
Brunei
BRUNEI
SOUTH CHINA SEA
CELEBES SEA
SARAWAK
Sibu
Kuching
Equator

Map 3. Northern Borneo.

square miles, has more inhabitants than all of British Borneo.

Map 1 British Borneo has three main landform regions; a low and often swampy coastal plain averaging ten to fifty miles in width, an upland region with hills averaging 600 feet in height, and a mountainous region in the interior. Rising to more than 4,500 feet in many places, these interior ranges separate British Borneo from the Indonesian part of the island.

Like Malaya, Borneo has a tropical monsoon climate, with hot weather throughout the year and an annual rainfall of more than 100 inches in most areas. This is almost five times the annual *pp. 210 & 211* precipitation in Alberta. Because of the monsoonal change in wind direction, the time of heaviest rainfall varies from place to place. In the east, for example, the heaviest rains fall from November to February when northeast monsoon winds bring moisture from the sea, while in the west maximum rains occur from May to September when the monsoon winds blow from the southwest.

The hot, wet climate encourages the growth of dense tropical rainforests that cover all of British Borneo except the swampy areas, which have natural vegetation suited to water-covered lands. Sandalwood, camphor, and several other valuable tree species grow in the rainforests, and forestry is an important industry.

The native peoples are Malays and Dyaks. Living along the coasts, the Malays grow crops of wet rice and rubber; the Dyaks dwell in the interior and live by hunting and by practising shifting cultivation. More primitive than the Malays, the Dyaks practise pagan religions and adorn their bodies with numerous tattoos. Only recently did they give up headhunting. They outnumber the Malays, who are mostly Moslems, by about two to one.

The largest non-native group consists of Chinese people who are about as numerous as the Malays. Like the Malays, some Chinese cultivate small farms; but many others work on rubber plantations and are active as oilfield workers, handcraftsmen, clerks, and storekeepers.

Rice, rubber, pepper, and copra are the leading agricultural products. The shifting cultivators of the interior grow only meagre crops of dry rice and native vegetables, but permanently settled farmers on the coastal plain produce good crops of wet rice and rubber on their small holdings. Rubber, which is also produced on large plantations, is the main agricultural export. British Borneo is the world's principal source of pepper. Coconut production is sufficient to allow for the export of copra, but the rice crop is inadequate for local needs, and large supplies of food must be imported. Oil is the only important mineral found in this area, and Borneo is one of the largest producers of oil in the Commonwealth. Manufacturing is limited to the refining of oil, sawmilling, and the processing of rubber, coconuts, and other local products. *Map 3*

Transportation facilities are poor. There are few roads in the interior, and the rivers are the chief means of communication. Near the coasts there are a few roads and railways, but most goods move by coastal boats. Local airlines connect the largest cities, and air service to other countries is available. The largest cities, which include Kuching (56,000), Sibu (20,000), Brunei (16,000), Jesselton (11,700), and Sandakan (14,500) are also the chief ports.

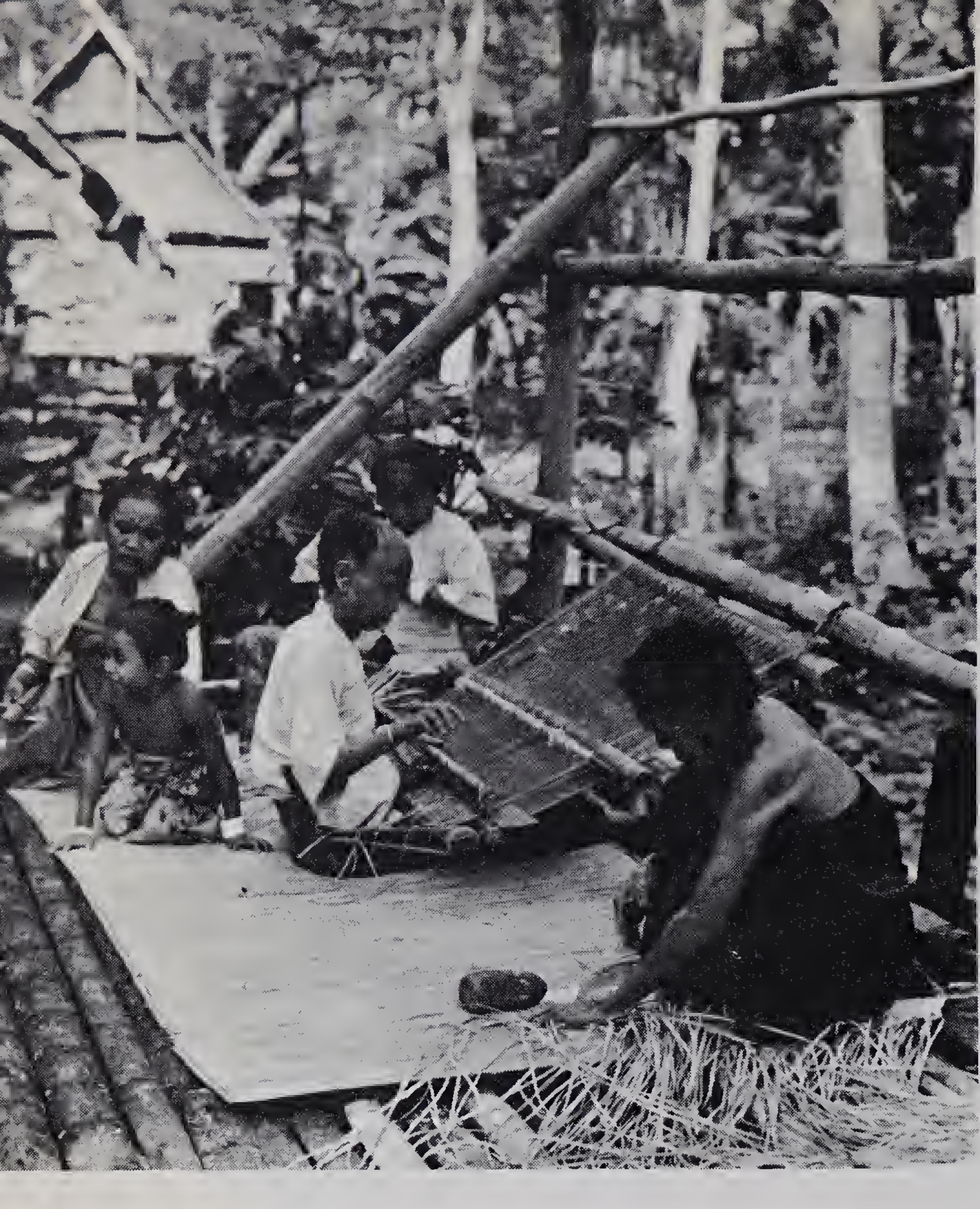


Figure 4. Weaving and Mat Making in Southeast Asia.
Native crafts and industries are of far greater importance than large-scale industries in Northern Borneo where manufacturing is still in its infancy. What building material has been used to construct the floor and fencing?

PROBLEMS AND CONCLUSIONS

Living and working in Malaysia are made difficult by the tropical *Fig. 2* climate, dense rainforests, and poor tropical soils. The hot, humid weather discourages hard work and endangers good health. Agriculture is restricted to the raising of tree crops and the subsistence farming of relatively small areas of alluvial soils. Fishing supplies vital protein for the Malayan diet but does not contribute to exports. Mining and forestry produce export products but do not *Fig. 1* employ large numbers of workers. Few jobs are available in factories and offices because there are not many industrial and commercial establishments in the country.

Malaya's economy is overly dependent upon the sale of rubber and tin, its only major exports. Periodic overproduction of these products and the development of synthetic substitutes for rubber seriously affect the demand for rubber and tin. When the demand for these products lessens, prices drop, and lower wages and, in many cases, unemployment result. Although social and economic conditions are better in Malaysia than in many other parts of Asia, standards of living, health, and education remain much lower than those found in the more prosperous nations of the Commonwealth.

The presence of a large group of Chinese inhabitants causes problems in Malaysia. Bad feelings exist between the easy-going Malays and the hard-working Chinese. The native Malays resent the dominant position held by the Chinese in business and trade; differences in manners, customs, and religious beliefs increase the friction between them.

Communism is also a cause of tension in Malaysia. For several years following World War II, Communist rebels waged a civil war against the government of Malaya. Although the revolt was put down, Communist rebels and nearby Communist China pose a constant threat to the freedom and independence of Malaysia and its people.

WORK UNIT —

The Language of Geography Add to your reference list, definitions for the following terms: camphor, headhunting, kiln.

Problems and Projects

1. Construct a bar graph to compare population densities in Malaya, Singapore, the United Kingdom, and Canada.
2. What factors make Singapore one of the busiest cities and seaports in the world?
3. Consult an encyclopedia to determine whether Canada or Borneo is the larger producer of Commonwealth oil.
4. What, in your opinion, is the greatest problem the new Malaysian Federation will have to face?
5. How would trapping, as practised in Malaysia, differ from trapping in Canada's northland?

REVIEW QUIZ

Copy the correct answer for each question. Place the entire statement in your notebook and state the page number of your textbook which supports your answer.

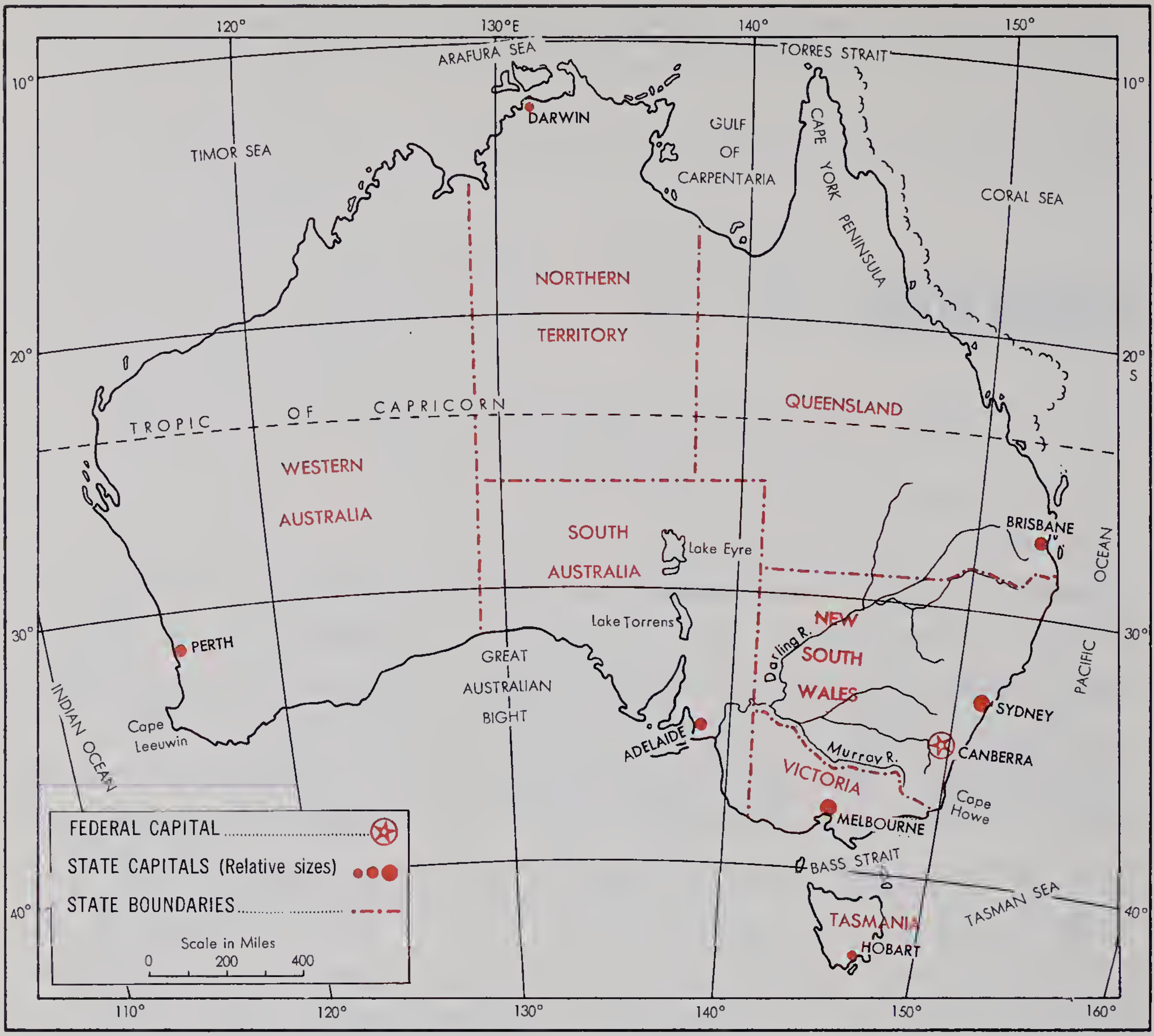
1. Malaysia is comprised of Malaya, Singapore, and (Indonesia, British Borneo, Papua).

2. The mainland and island sections of the proposed Federation form a crescent-shaped arc stretching about (500, 600, 700) miles north of the equator.
3. An important tropical hardwood found in Malaya is (ebony, teakwood, mahogany).
4. Rattans are used for (boats, baskets, trays).
5. The chief occupation of the Malays is (fishing, mining, farming).
6. Small native holdings account for (20%, 30%, 40%) of Malaya's total rubber output.
7. Copra is manufactured into (copper, soap, ornaments).
8. Malaya's chief food crop is (rice, millet, cassava).
9. Malaya produces about (25%, 50%, 75%) of the world's tin.
10. Much of Malaya's tin ore is refined in (Penang, Borneo, Calcutta).
11. Most of the business enterprises of Malaya are owned by (Malays, Chinese, Britishers).
12. Malaya's largest city is (Kuala Lumpur, George Town, Singapore).
13. Singapore's population is about (¼, ⅕, ⅙) that of Malaya.
14. Borneo receives (5, 6, 10) times as much precipitation as Alberta.
15. Only recently have the (Malays, Dyaks, Kanus) given up head-hunting.
16. The world's principal source of pepper is (Sarawak, Borneo, Malaya).
17. Canada and (Borneo, Sarawak, Malaya) are the largest producers of oil in the Commonwealth.
18. Singapore is a member of (NATO, ANZUS, SEATO).
19. Malaya is almost the same size as (England, Alberta, Prince Edward Island).
20. Malaya became an independent member of the Commonwealth in (1957, 1958, 1960).

Australia

Australia is the only inhabited continent that is entirely in the Southern Hemisphere. The Tropic of Capricorn (23½° South Lat.) passes through the middle of the continent, placing slightly less than one-half of Australia in the Tropics and the rest in the Mid-Latitudes. Although Australia stands out clearly on a world map, it is the least significant of all the peopled continents. The term "Australasia" is used to describe Australia, New Zealand, New Guinea, and several large island groups of the Southwest Pacific Ocean. An even broader term, "Oceania", is employed to describe the same territories as "Australasia", except that it also includes the numerous small islands of the broad Pacific Ocean. The meanings of these various terms should be borne in mind when the text refers to Australia as a "continent". *Map 1*

Australia was discovered by Dutch sailors in the early 17th century, but it was not until after 1770 that any development took place. In that year, Captain James Cook visited the attractive southeast coast of the continent and claimed the area for England. At first, progress was slow because England thought of Australia only as a place to send convicts. These unwilling pioneers were first settled in the Botany Bay area south of the present site of Sydney, and later other settlements were established in a similar fashion. Many of these convicts were not criminals in the modern sense but were the victims of the harsh laws of the times. Their courage and adventurous spirit contributed greatly to the building of the country.


120°
130°E
140°
150°
ARAFURA SEA
TORRES STRAIT
10°
10°
DARWIN
TIMOR SEA
GULF OF CARPENTARIA
CAPE YORK PENINSULA
CORAL SEA
NORTHERN TERRITORY
20°
20° S
TROPIC OF CAPRICORN
QUEENSLAND
WESTERN AUSTRALIA
SOUTH AUSTRALIA
Lake Eyre
BRISBANE
OCEAN
Lake Torrens
NEW SOUTH WALES
Darling R.
30°
30°
PERTH
GREAT AUSTRALIAN BIGHT
PACIFIC
SYDNEY
INDIAN OCEAN
Cape Leeuwin
ADELAIDE
Murray R.
CANBERRA
VICTORIA
Cape Howe
MELBOURNE
FEDERAL CAPITAL
STATE CAPITALS (Relative sizes)
STATE BOUNDARIES
Scale in Miles
0
200
400
BASS STRAIT
40°
40°
TASMAN SEA
TASMANIA
HOBART
110°
120°
130°
140°
150°
160°

Map 1. Political Areas.

Like Canada, Australia is a completely independent nation which voluntarily belongs to the Commonwealth of Nations and acknowledges the Queen of the United Kingdom as its monarch. Australia also resembles Canada in that it is a federation of several provinces, or to give them their correct name, "states". There are six states—New South Wales, Victoria, Queensland, Tasmania, South Australia, and Western Australia. In addition, there is the Northern Territory, which, like our Northwest Territories, is under the control of the federal government. As in Canada, there are provincial, or state governments and a national, or federal government, with definite fields of legislation and administration assigned to each. The national government conducts its administrative and legislative

Map 1

affairs in Canberra, the capital, which, like Washington in the United States, is located in a federal district. The Australian Capital Territory was established so that the nation's capital could not be said to be located in any one state, and it is completely controlled by the federal government.

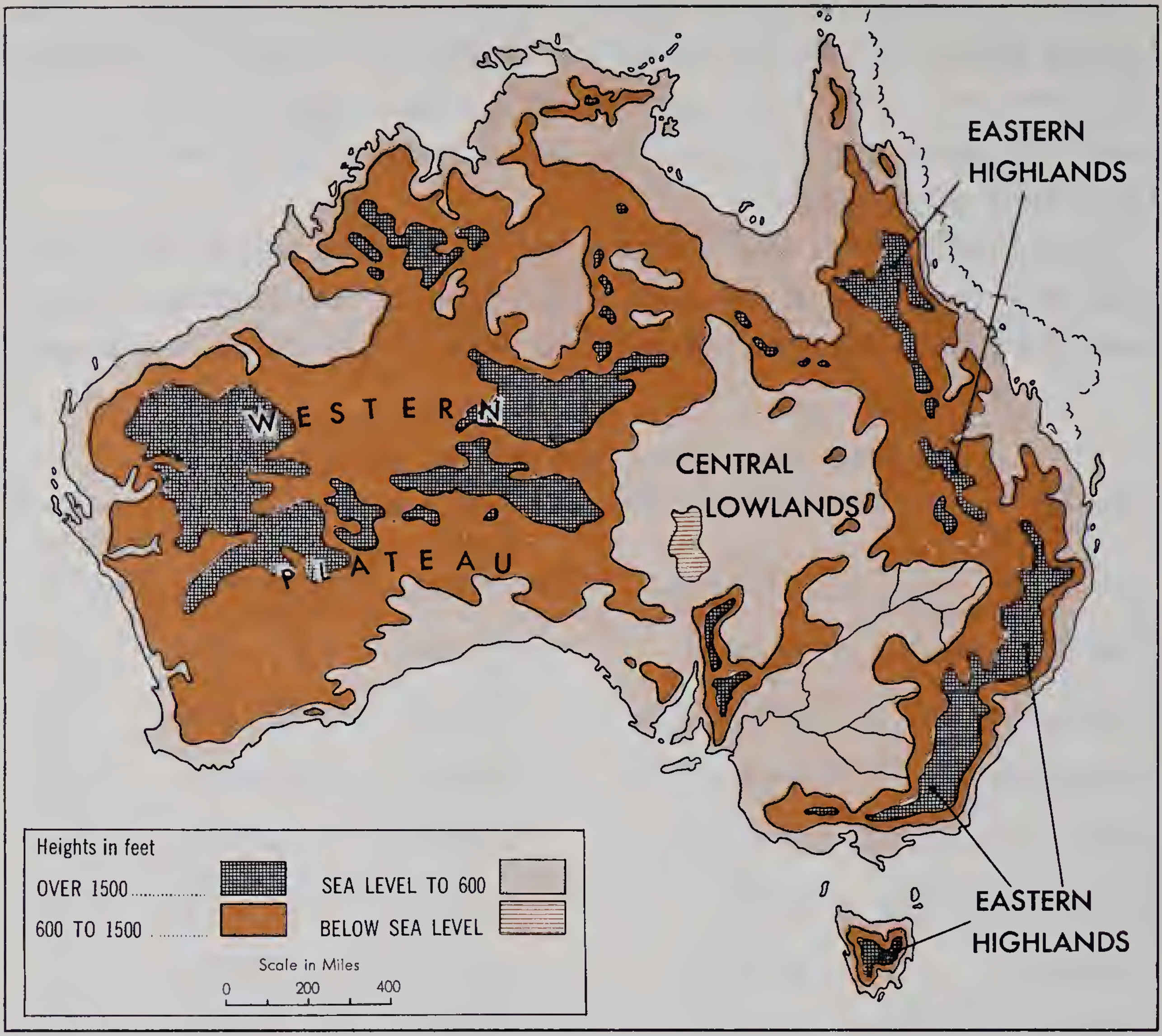
New South Wales and Victoria are the leading states. They contain well over half of the total population of Australia and dominate the industrial, commercial, and agricultural life of the nation.

STATES AND TERRITORIES OF AUSTRALIA

State	Capital	Area (sq. mls.)	Population*	Population Density
New South Wales	Sydney	309,433	3,917,000	12.6
Victoria	Melbourne	87,884	2,930,000	33.3
Queensland	Brisbane	670,500	1,519,000	2.2
South Australia	Adelaide	380,070	969,000	2.5
Western Australia	Perth	975,920	737,000	0.8
Tasmania	Hobart	26,215	350,000	13.3
Northern Territory	Darwin	523,620	27,000	0.05
Capital Territory	Canberra	939	56,000	59.7
Total	——	2,974,581	10,508,000	3.5

*excluding aborigines

Australia, unlike Canada, has colonies and also governs United Nations trust territories. Her colonies consist of (1) a few small islands in the Indian and Pacific Oceans, (2) a section of the Antarctic continent with an area of almost 2½ million square miles that is claimed by Australia, and (3) Papua, the southeastern part of the large island of New Guinea to the north of Australia. Entrusted to Australia as a United Nations trustee are Northeast New Guinea and several groups of islands.


EASTERN HIGHLANDS
WESTERN PLATEAU
CENTRAL LOWLANDS
EASTERN HIGHLANDS
Heights in feet
OVER 1500
600 TO 1500
SEA LEVEL TO 600
BELOW SEA LEVEL
Scale in Miles
0
200
400

Map. 2. Landforms.

SIZE AND LANDFORMS

Australia is the world's smallest continent, and the only continent occupied entirely by a single country. Its area—2,974,581 square miles—is three-quarters the size of Canada. Its greatest extent from north to south is 2,000 miles, and from east to west is 2,400 miles. Australia's lengthy coastline—12,000 miles—equals almost half the world's equatorial circumference. Distances, therefore, influence Australian life greatly. One particularly large ranch (11,262 square miles) in northern Australia is half the size of Nova Scotia (21,068 square miles). A typical ranch in Australia is more than half the size of Prince Edward Island.

Millions of years of erosion by wind, rain, and water have worn the surface of the continent down, making much of it flat and reducing the height of the mountains. Less than seven per cent of the surface is above 2,000 feet; the highest mountain, Mt. Kosciusko, in New South Wales, is only 7,328 feet high.

The continent of Australia consists of three major physical regions: (1) the Eastern Highlands, (2) the Western Plateau, and (3) the Central Lowlands. *Map 2*

The Eastern Highlands extend from Cape York Peninsula in the north to Bass Strait in the south and rise again across that strait on the mountainous island of Tasmania. These highlands constitute about one-sixth of the continent and support about five-sixths of the country's population. To the north, the elevation is generally about 2,000 feet, but to the south, in New South Wales and Victoria, it varies from 2,000 to 6,000 feet. The mountains in this region are like the Canadian Laurentians in that they are not rugged but have rounded tops. Highest and most notable of the numerous mountain ranges comprising the Eastern Highlands are, from south to north, the Australian Alps, the Blue Mountains, the Liverpool Range, and the New England Range. The Eastern Highlands, considered as a group, are also called the Great Dividing Range. *Fig. 1*

The Western Plateau occupies the western half of the continent. It ranges between 600 and 1,500 feet above sea level and is covered with a very thin layer of soil and/or wind-blown dunes. Low, rocky, mountain ranges, such as the MacDonnell and Musgrave Ranges, rise from the plateau. There are no permanent rivers in the central region, and much of this area is desert with neither trees nor grass. Tall native grasses thrive to the northeast and west of the dry area. Only the southwestern portion of Western Australia, an area of 50,000 square miles, is well supplied with timber and agricultural land.

The Central Lowlands lie between the Eastern Highlands and the Western Plateau. The southeastern portion of the Lowlands comprises the drainage basin of the Murray-Darling river system, which is mainly less than five hundred feet above sea level. A series of mountain ranges called the South Australian Highlands stretch northward from the south coast along the western edge of the

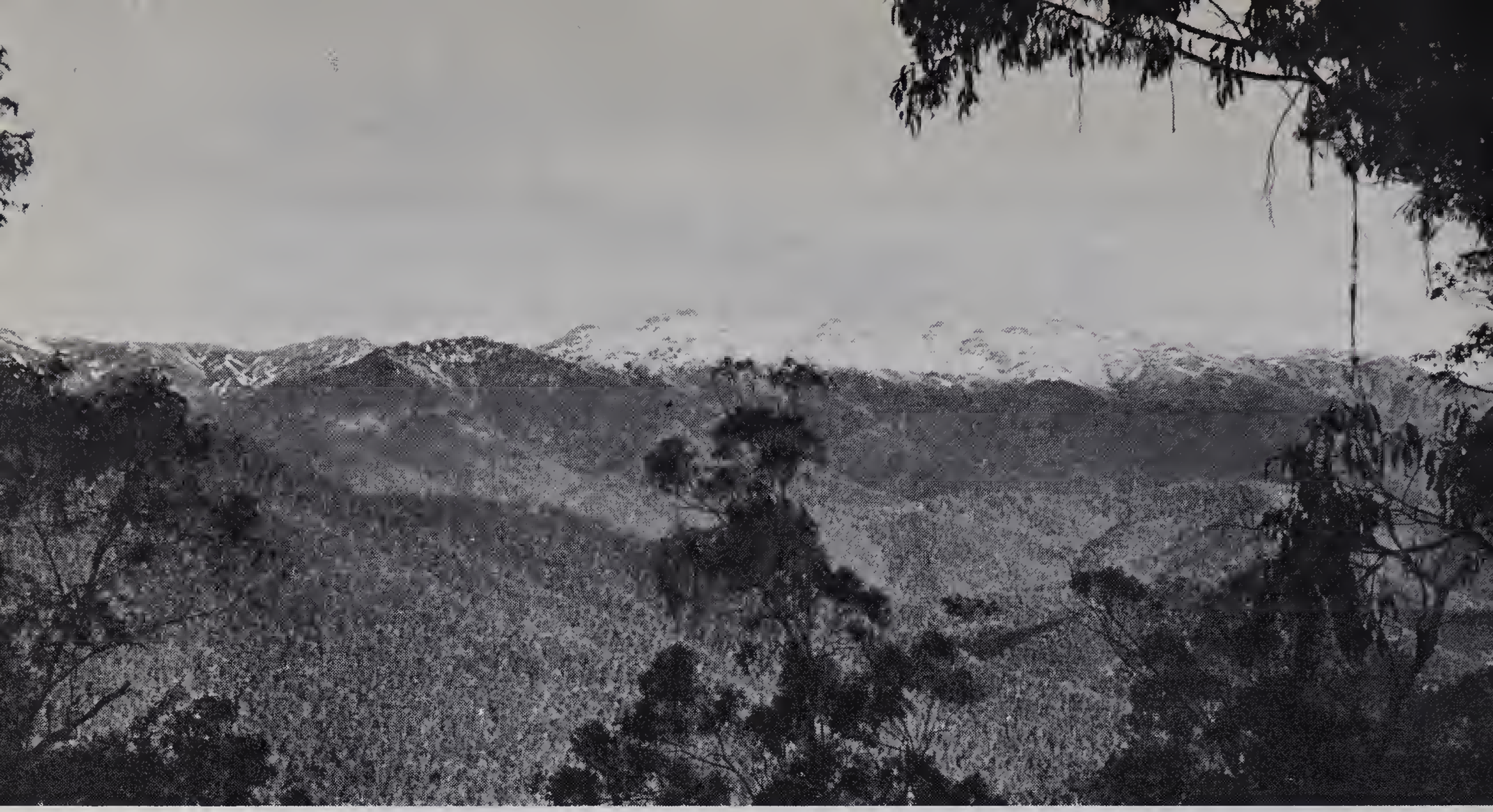


Figure 1. The Australian Alps, New South Wales.
The highest mountain in Australia, Mount Kosciusko (7,328 feet), is in this area. Because of the low elevation, the forests reach almost to the peaks. Such well-watered areas are found in only a few parts of the country and are in sharp contrast to the vast desert regions.

Murray-Darling Basin. The main range in these highlands, the Flinders Range, rises less than 4,000 feet. A rift valley to the west of the South Australian Highlands runs roughly parallel to the ranges of the Highlands. The Rift Valley of South Australia is partly occupied by Spencer's Gulf and Lake Torrens.

The middle section of the Central Lowlands consists of the Lake Eyre Basin, which is an area of inland drainage similar to those described earlier, in the Africa section of the book. The few streams of the basin flow at very irregular intervals into Lake Eyre, which lies 39 feet *below* sea-level.

The northern portion of the Central Lowlands, the Carpentaria Basin, is made up of the lowlands that are drained by streams flowing northward into the Gulf of Carpentaria. This section of the Central Lowland and the northern parts of both the Lake Eyre and *Map 5* Murray-Darling Basins contain the largest artesian basin in the world. Rain and river water sink below the surface of the earth and *Fig. 2* are trapped between water-tight layers of rock. When wells are bored through the upper rock layer, the water is forced up by natu-

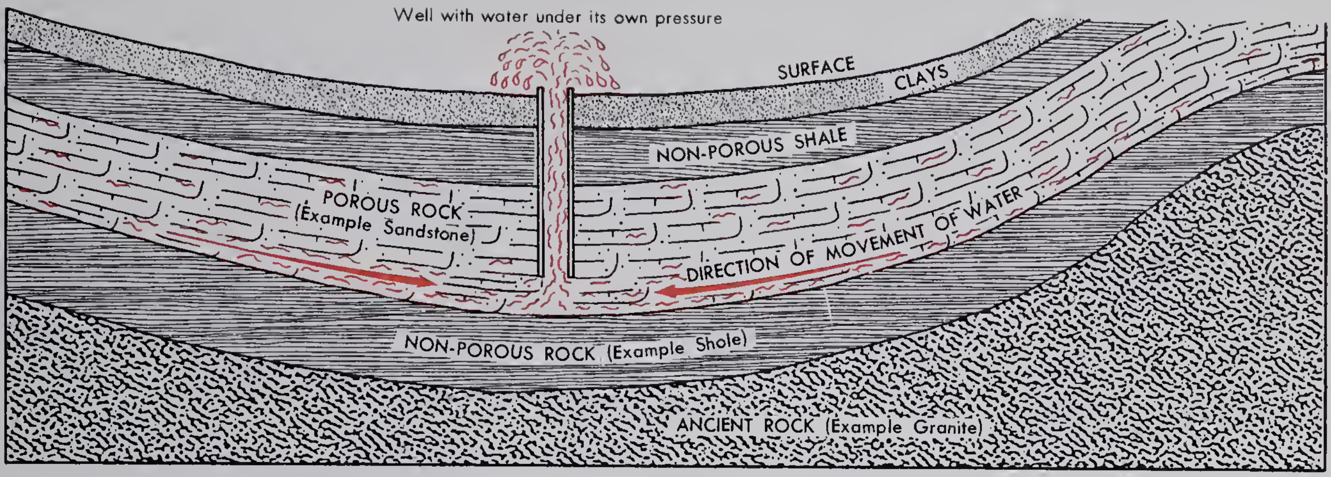

Well with water under its own pressure
SURFACE
CLAYS
NON-POROUS SHALE
POROUS ROCK (Example Sandstone)
DIRECTION OF MOVEMENT OF WATER
NON-POROUS ROCK (Example Shale)
ANCIENT ROCK (Example Granite)

Figure 2. Diagram of an Artesian Well.
Because the outlet of the well is below the level of the source of the water, the water is forced upwards by hydrostatic pressure. Such wells are found where a porous layer of rock is sandwiched between two non-porous layers. The rain falling on the outcrop of the porous layer filters through it and collects underground.

ral pressure. This process is illustrated in the accompanying diagram. The *artesian wells* formed in this way provide water for millions of sheep and cattle raised on the extensive grasslands of the Central Lowlands. The importance of these wells is increased by a shortage of permanent rivers and lakes.

Coasts: Australia has a very smooth coastline. The Gulf of Carpentaria and the Great Australian Bight are the only large inlets, but along the east coast in particular there are many fine harbours. In Queensland many of these eastern ports are protected by a great coral reef. This coral formation, the greatest in the world, stretches for 1,250 miles along the northeast coast of the continent. Called the Great Barrier Reef, this long chain of over *Fig. 3* 500 islands and countless reefs marks the edge of the continental shelf that once joined Australia to Asia. The reef is located as little as 30 miles away at some points, and up to 100 miles away at others. It has not been entirely explored and has an average width of 35 miles. Numerous lighthouses and marker buoys make ship travel between the shore and the reef fairly safe. Fortunately, the reef is far enough from the coast to allow ships to pass between

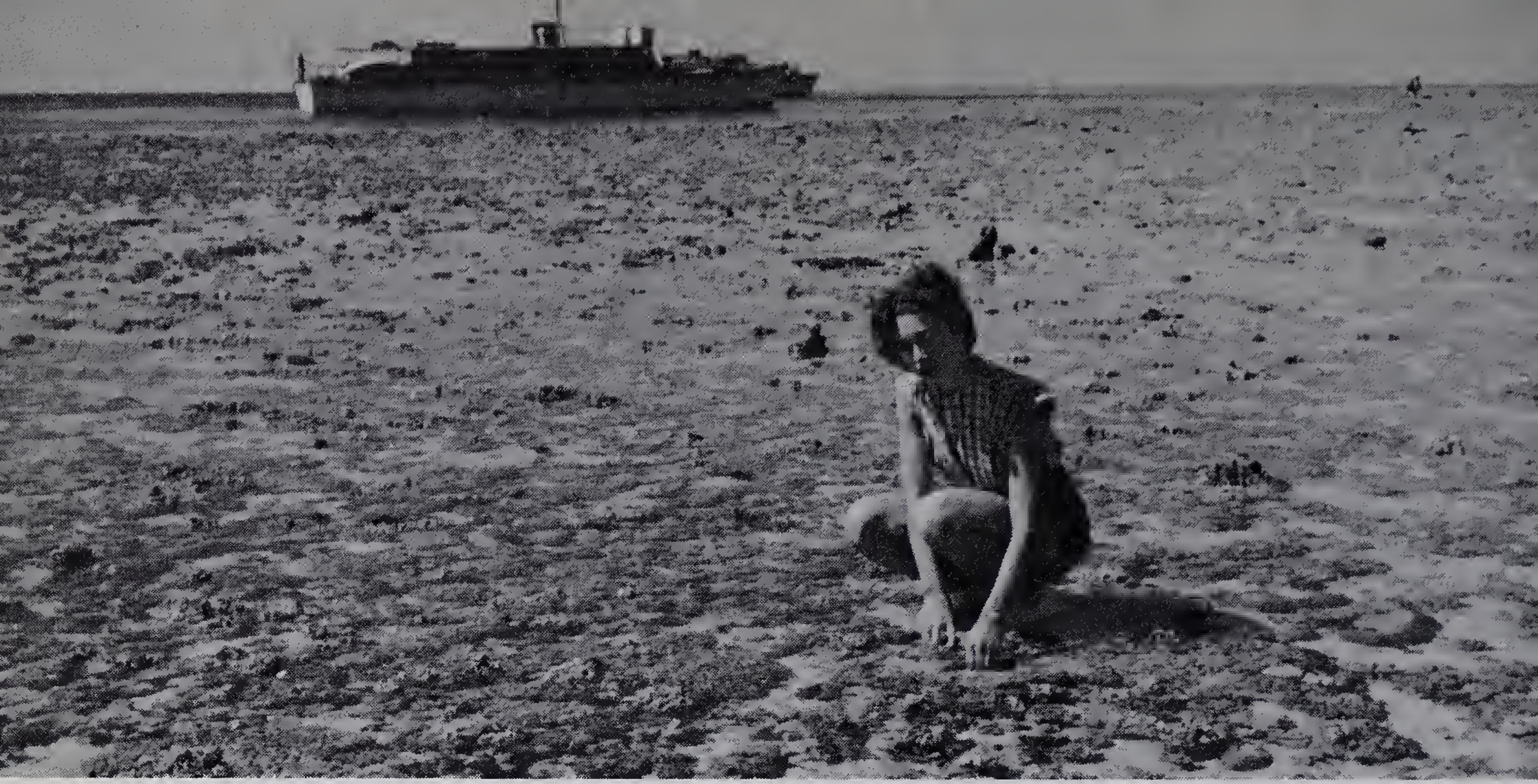


Figure 3. The Great Barrier Reef.
This huge coral reef extends for 1,200 miles down the coast of Queensland. It is an attraction for naturalists as well as tourists. Countless species of tropical fish abound in the warm shallows, and the coral itself is an amazing and beautiful creation.

it and the shore, and many small ports have grown up along the Queensland Coast.

Coral is composed of a small sea animal called a *coral polyp,* which lives in shallow tropical seas. When the coral polyp dies, the softer parts of the body decay and are washed away, but the skeleton is left behind. Each new generation of corals builds on the skeletons of former generations, thus adding new layers to the original formation. The coral gradually builds up to the level of low water (the level at which the fall of the tide never leaves it exposed) and then grows outward. Many different types of coral, varying in colour, shape, and size, contribute to the building process. Some look like organ pipes; others resemble cauliflowers, mushrooms, or honeycombs. Millions of coral skeletons contribute to the construction of a reef, and the process continues endlessly in the warm, shallow waters.

Tourists who visit the reef are fascinated not only by the coral, but also by the many strange fish and other sea animals that live on the reef. These include a large variety of colourful shell fish, giant clams that grow over a yard in length and weigh hundreds of pounds, sea cucumbers, turtles, porcupine-like sea urchins, and star-fish. The more dangerous inhabitants of the reef are salt-water crocodiles, which often attain a length of thirty feet, sting-rays, sharks, and stone-fish, which resemble coral but have deadly poisonous spines along their backs.

CLIMATE

Temperature Since Australia is south of the equator, the seasons are the reverse of those in Canada: winter comes in June, July, and August as it does in South Africa.

Three dominant factors control the temperature pattern in Australia—(1) latitude, (2) oceanic influences, and (3) elevation:

(1) The northern half of the continent is located in the *Tropics* and, therefore, never experiences cool weather or ground frosts. Along the north coast, for example, it is always hot, with a January (summer) average of over 80° F. and a July (winter) average of 75° F. In the interior region of the north, the winters are cooler but can still be described as warm. Southern Australia lies in the warmer half of the *Mid-Latitudes*. Here, summers are warm (65° F. to 75° F.) and winters are mild (the low 50's). Located south of latitude 40°, the island of Tasmania also has warm summers, but winter temperatures drop to the mid-forties (45° F.). The parts of Australia which are outside the Tropics are subject to ground frosts during the winter.

(2) Large bodies of water reduce the heat of summer and provide warmth in the winter. Thus, the moderating effect of the oceans upon the temperatures in Australia is strong and effective throughout because of the comparatively small size of the continent. Central and southern Australia do not experience the great changes of temperature between winter and summer that are so common in central Canada, which is far removed from the moderating influence of the oceans. Although Tasmania is located approximately the same distance south of the equator as Southern Ontario is north of it, that state of Australia has cooler summers, but milder winters than Southern Ontario. The mild winters allow Australians to play several outdoor sports throughout the year.

Many have become world famous in such outdoor sports as swimming, tennis, golf, and track and field.

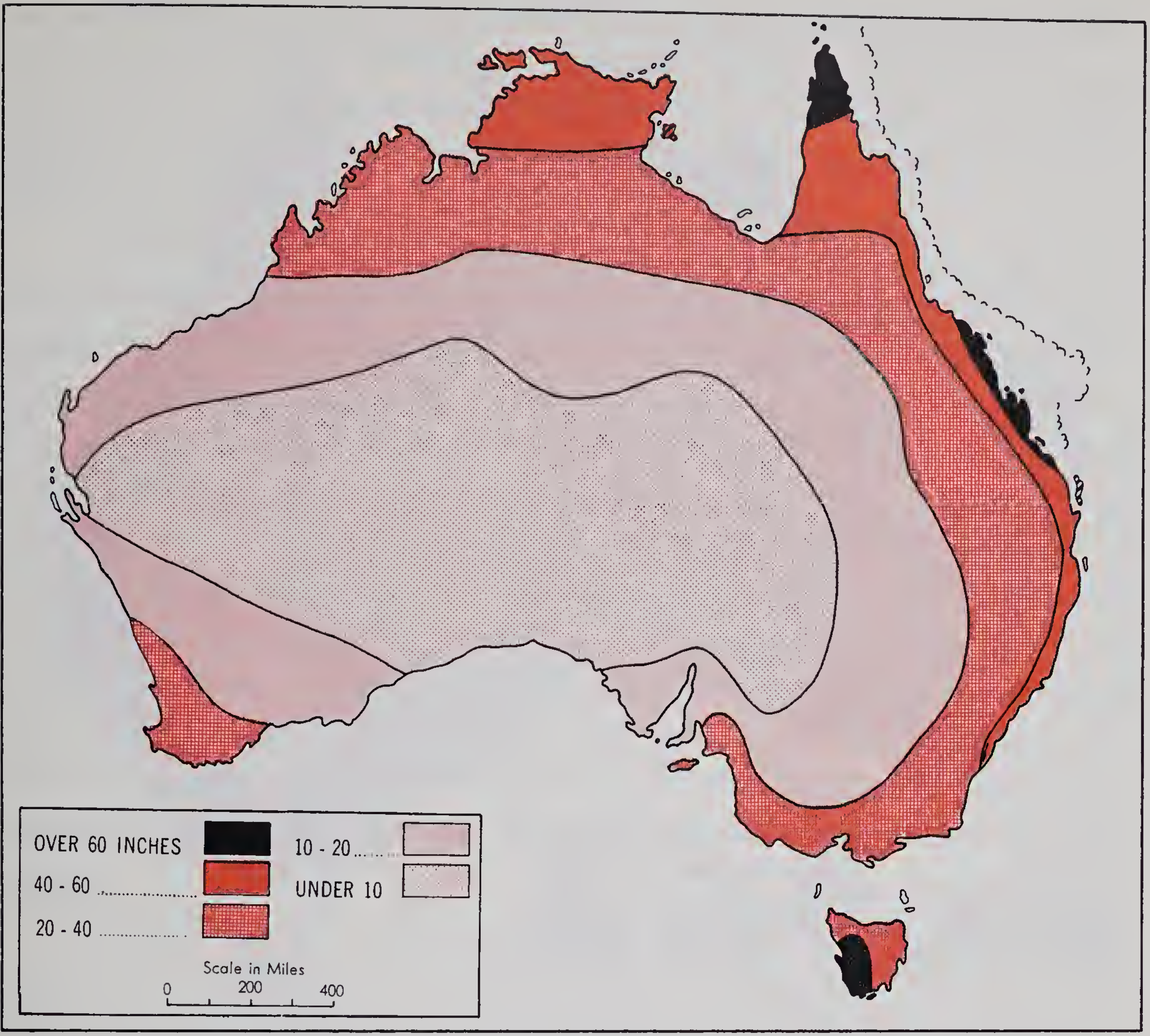
(3) *Elevation* has a limited effect upon temperature in Australia because the highland areas are small in both area and height. The highlands which exist are, of course, cooler than the surrounding lowlands. That section of the Eastern Highlands which lies south of Brisbane is the only part of the continent that normally receives snow in winter. Snow never falls in northern Australia and is very rare at elevations below 2,000 feet in southern Australia.

Map 3 **Rainfall** Australia is the driest inhabited continent. Over one-third of the country gets less than ten inches of rain in a year, creating a huge desert area similar to that of the American Southwest. A mere one-tenth of the continent receives more than 40 inches of annual rainfall.

Several wind systems influence the rainfall pattern of Australia, but the location of landforms causes the dryness, which is the outstanding characteristic of the Australian climate. The Eastern Highlands prevent rain-bearing air masses from entering on the east, and the plateau of Western Australia effectively stops the advance of moisture-laden air from the other directions. Consequently, only the edges of the continent are well watered; the entire inland region suffers from a severe shortage of rainfall. The rainfall of the interior is not only small in amount but also, very unreliable. An extremely long period of drought may be broken by a series of violent downpours only to be followed by another long period of drought. In areas with an average yearly rainfall of five inches, it is not uncommon for a year or two to pass without any rain falling. However, artesian well water is available in some parts of this vast dry land.

Map 4 **Climatic Regions** Because of its large area, Australia has several climatic regions, as follows:

The North — A broad belt stretching across northern Australia and extending part way down the east coast has a constantly warm climate with summer rainfall. The other seasons are dry. The extreme summer heat in the north creates a huge centre of low pressure over northwestern Australia. Since air always moves *into* areas of *low* pressure, the winds come from the warm seas north

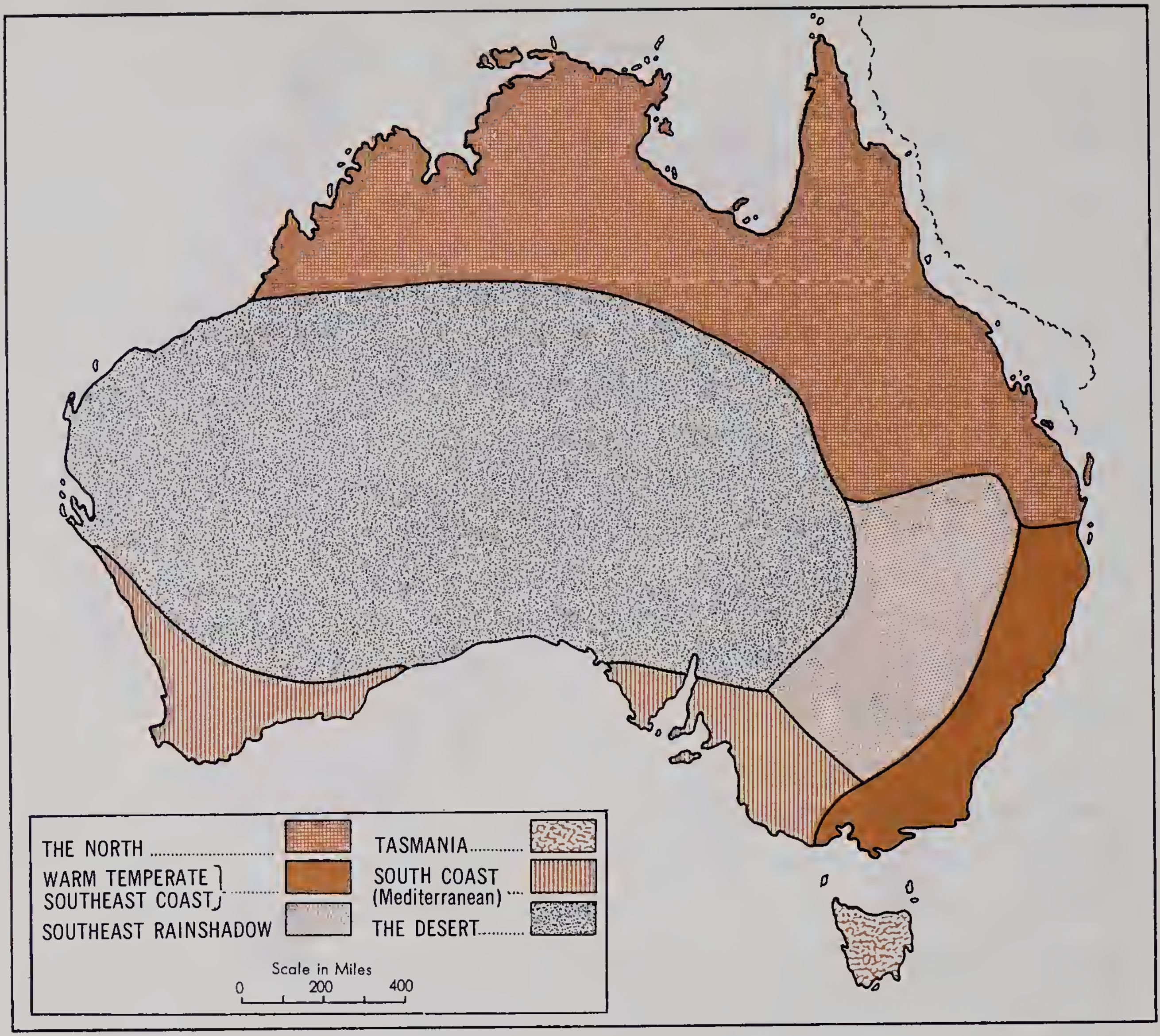


Map 3. Annual Rainfall.

of the continent, bringing heavy rainfall in the summer months. In winter, the low pressure system disappears; and a centre of high pressure builds up in the interior. Since air moves *out of* areas of *high* pressure, the winter winds blow from the dry interior towards the coasts, causing a long, dry winter season. Seasonal winds of this type are called *monsoon* winds.

The northeast coast of Queensland is one of the wettest areas on the continent because it receives rainfall from both monsoon and Southeast Trade winds, which obtain moisture from the warm Coral Sea. The Trades yield heavy rainfall as they are forced to rise up the windward slopes of the Eastern Highlands.

The Warm Temperate Southeast Coast — Eastern Victoria


THE NORTH
WARM TEMPERATE SOUTHEAST COAST
SOUTHEAST RAINSHADOW
TASMANIA
SOUTH COAST (Mediterranean)
THE DESERT
Scale in Miles
0
200
400

Map 4. Climatic Regions.

and the coastal lands of New South Wales are located in this region. Here rain comes throughout the year. The summers are warm and the winters comparatively mild. All sections of this region receive more than 20 inches of rain, making it an important farming area.

p. 208 *The Southeast Rainshadow* — When the Southeast Trades descend the western slopes of the Eastern Highlands, they become drying winds, thus creating a dry area known as a *rainshadow.* This same effect influences the climate of western Canada, where westerly winds become drying winds as they descend the leeward slopes of the mountains. Yearly rainfall averages from 10 to 20 inches, enough to create valuable grasslands for livestock.

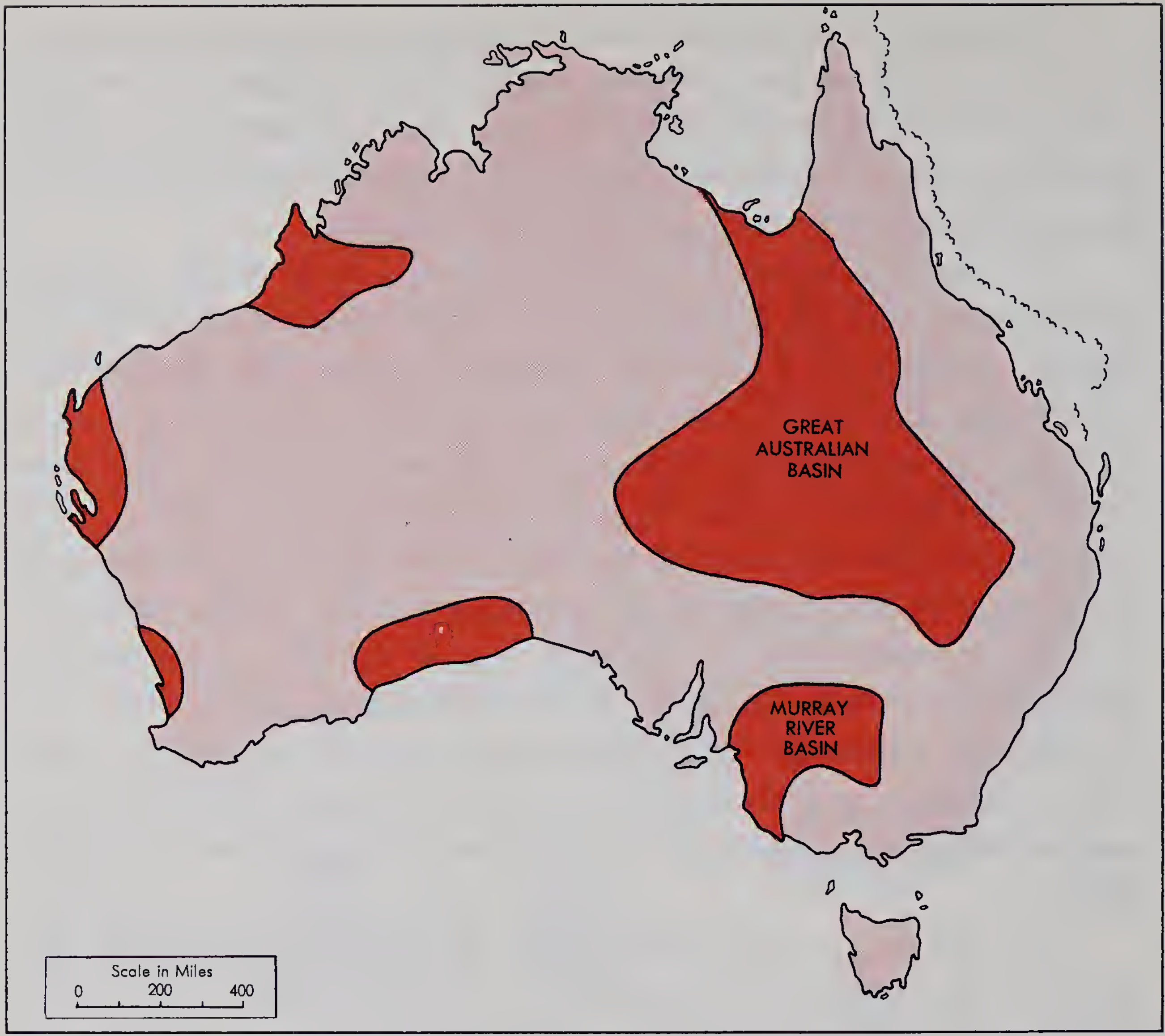
Tasmania — Air masses constantly approaching Tasmania from the west bring the island plentiful rainfall all year. Since the western half of the state is reached first by this moisture-laden air, rainfall exceeds 40 inches in the west. Most of the eastern half receives less than 40, but more than 20 inches of rain in a year.

The South Coast — The southwestern corner of the continent and the lands immediately east of the Great Australian Bight have a climate similar to the type found along the shores of the Mediterranean Sea. For that reason, the climate of this region is known as a *Mediterranean Climate*. Warm, dry summers and cool, wet winters are the rule in such regions. This pattern is the result of shifting wind systems. In summer, most of the south coast suffers from the same drying factors that make inland Australia a desert; and so the summers are generally dry. In the winter, however, the air masses that affect Tasmania travel a more northerly path and so pass over much of southern Australia. Having travelled over the warm ocean water before striking land, these moist air masses bring winter rainfall to southwestern Australia and the land east of the Great Australian Bight.

The Desert — The west coast, the south-central coast, and much of the interior of Australia are very dry. These areas receive less than ten inches of yearly rainfall. Many factors combine to create this huge area of desert and semi-desert. (1) The monsoon *Map 4* winds blow only over the northern third of the continent, (2) the trade winds lose most of their moisture in the Eastern Highlands and become steadily drier as they cross the continent, (3) the westerly winds, which bring rain to parts of the south coast, do not pass over water before reaching the central part of the south coast, and (4) few high areas exist in the interior to make air rise and thereby lose its moisture.

RIVERS AND LAKES

Along a one-thousand-mile stretch of Australia's south coast, not one stream flows into the ocean! Many of Australia's rivers are affected by the blazing sun and lack of rain. Some rivers in the interior disappear, devoured by the thirst of the dry soil.



Map 5. Artesian Basins.
Shows underground water supplies which may be tapped by artesian wells. Although most of the water is too salty for irrigation, it is usable for watering livestock.

Because of its variations in climate and surface, Australia has two types of rivers: (1) those which flow constantly to the coast, and (2) those which flow toward the interior of the continent and either are lost in the soil or break into scattered pools along the river bed. Streams which flow all year round are found only (1) in the southwestern corner of the country, (2) along the northern coast, and (3) in the Eastern Highlands. Over a large part of the continent, the word river takes on a different meaning and is the label given to a string of long, narrow pools occupying the bed of a stream that is gradually drying up.

The Murray and its tributaries form the major river system. The basin of this river system is 414,000 square miles, an area approximately equal to that of Ontario. The 1,600 mile-long Murray River is shorter than its main tributary, the Darling River (1,760 miles in length), but is more important than the Darling since the latter dries up in times of long droughts, often for as long as a year and a half. Even so, the Murray itself has dried up twice in this century. Both rivers are slow-flowing and winding because of the gentle slope of the Murray-Darling lowlands. The other main tributary of the Murray, the Murrumbidgee, flows 1,050 miles before it joins the main stream. *Map 1*

Like many of the rivers, most of the lakes of Australia are broad and shallow and vanish in dry weather. Lake Eyre, with a watershed of 500,000 square miles, is often waterless, exposing a bed of salt firm enough to support an armoured tank. The ups and downs of the water level may be explained by the fact that the watershed receives only five inches of rain a year. Many other lakes of Australia suffer the same fate, and, although they are marked on the maps as lakes, are usually no more than salt plains. Lake George, near Canberra, varies from being a lake 18 miles long to being useful grazing land. *Fig. 4*

Figure 4. Lake Eyre.
Lake Eyre is usually a "lake" in name only. Its mud flats are covered by a few inches of water only after heavy rains. The smooth area to the left is the dry lake bed; the light streaks in the background indicate former water levels and drainage courses. Irregular rainfall and high evaporation make this typical of many Australian lakes in the vast, desolate area of the Central Lowlands.

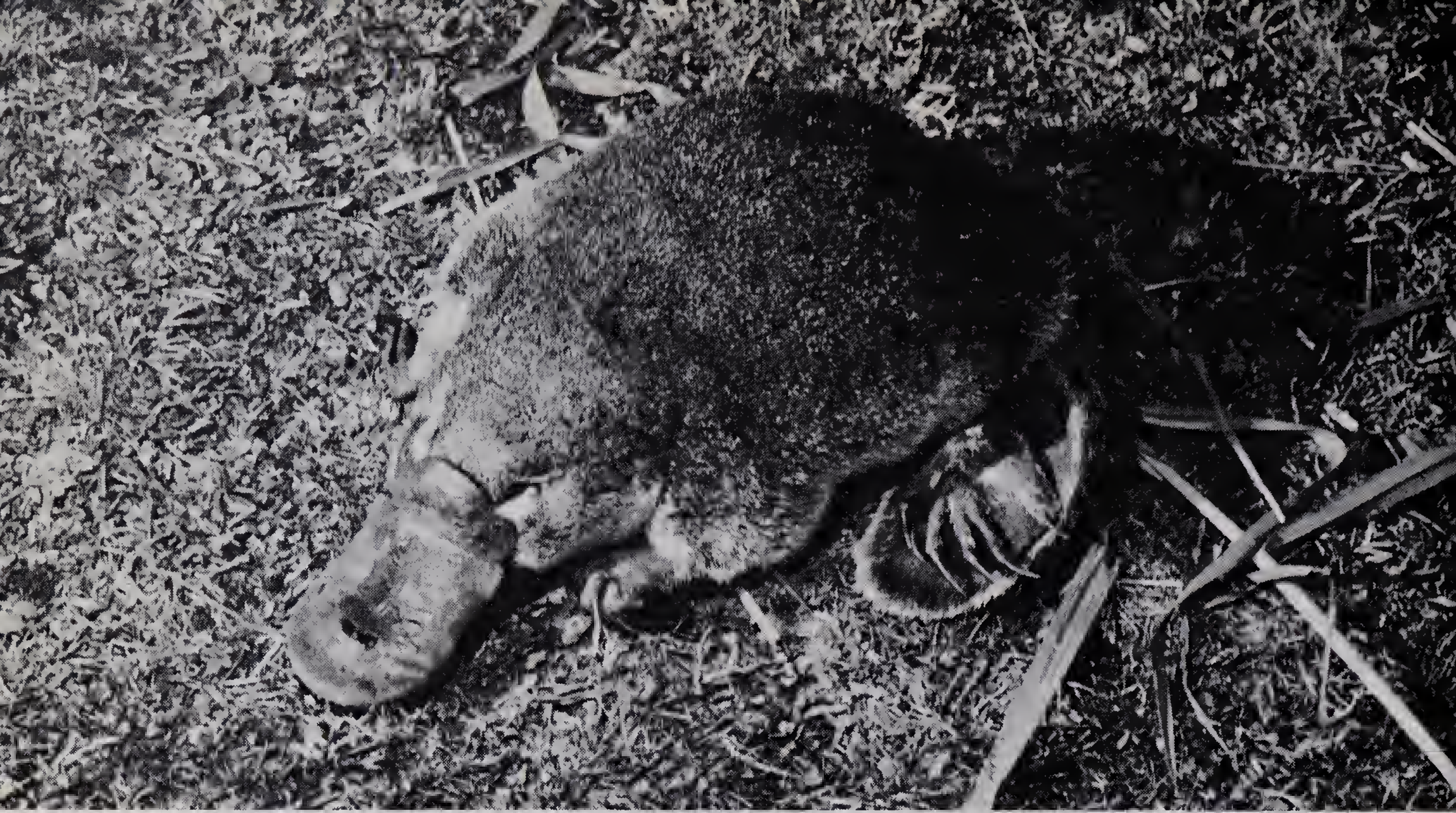


Figure 5. The Platypus.
The platypus is an extraordinary animal, with physical characteristics linking it to mammals, birds, fishes, and reptiles. It is a shy animal and lives in long burrows in the banks of rivers and creeks. It feeds on water-worms and insects and, full-grown, is about 18 inches long.

NATIVE PLANTS, ANIMALS, AND FORESTS

Many ages ago Australia was connected with the northern continents by a land bridge. At that time there were poorly developed plants and animals in the world, especially in the southern land masses. When Australia was cut off from the northern lands, her unique plants and animals survived because of the isolation and lack of predators. Therefore, the plants and animals of Australia are unlike those of any other continent. The strange animals of *Fig. 5* Australia illustrate this fact well. The platypus is probably the strangest mammal in the world: it lays eggs like a bird; it has a snout like a duck's bill, webbed paws, and fur like a beaver; but it feeds its young with milk from its body. Its strange cousin, the spiny anteater, or echidna, which looks somewhat like a porcupine, also lays eggs and feeds its offspring with milk which it gives off through pores in its body. In addition, it also grows a pouch in which to carry its young.

Animals with a pouch for carrying their young, *marsupials*, are native to Australia. The best-known examples are kangaroos, which are found in open grassy plains or sparsely forested land. Their main defence is the ability to hop at a fast rate, often hopping as far as thirty feet in one jump and as high as nine feet. There are several different types of kangaroos, ranging from the six-foot Grey or Boomer, and the Red, down to the 3-foot wallabies and 2-foot tree climbing kangaroos. Another well-known marsupial, the koala bear, is becoming extinct because he is completely dependent for food upon the leaves of only a few varieties of eucalyptus trees and because his only defence is his colouring, which makes him hard to find. *Fig. 17*

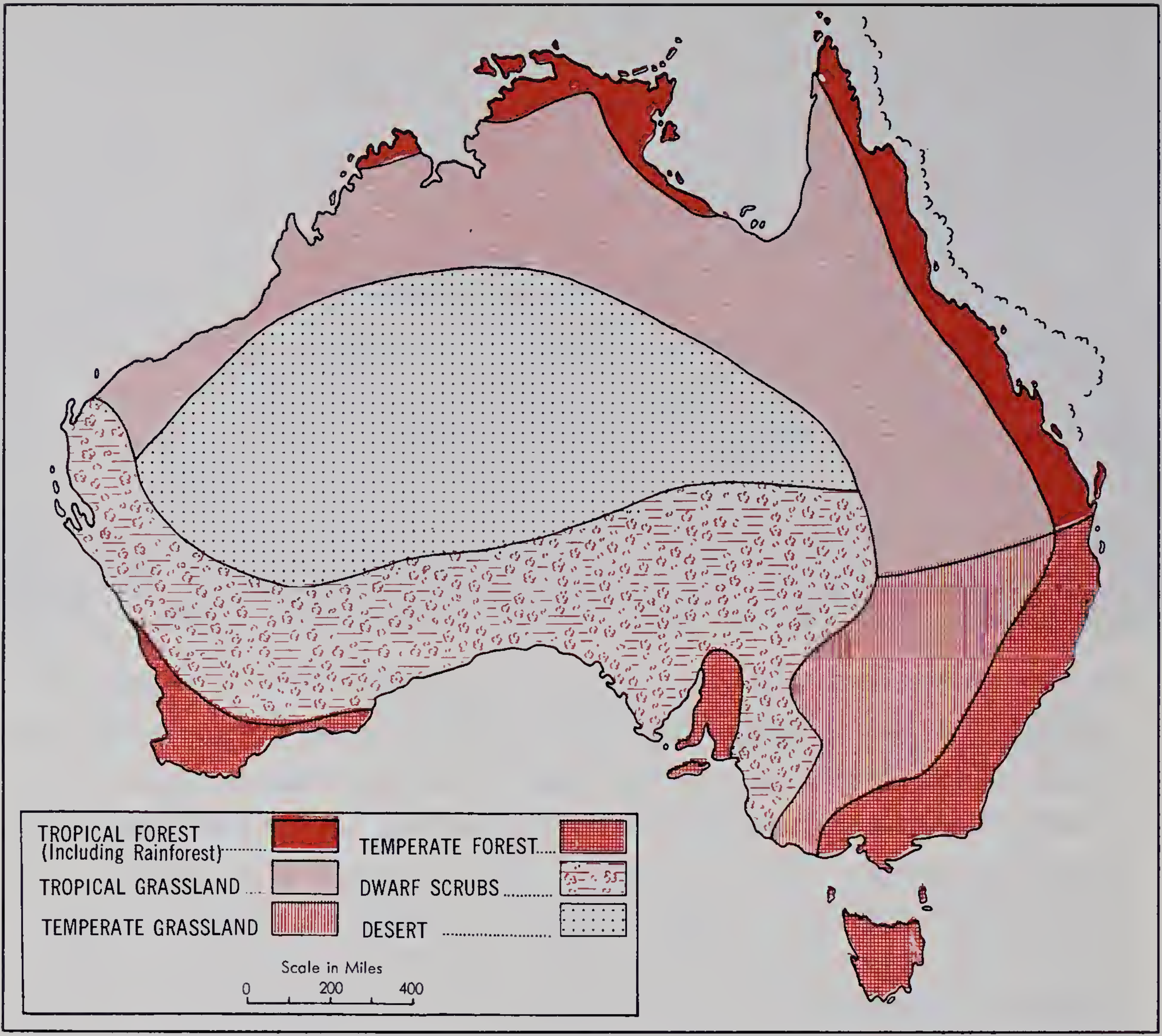
When the native dogs of Australia, the warrigal, mate with imported dogs, they create vicious, crafty sheep killers called dingos. They are such a menace that professional hunters are paid by the Australian government for the dingos that they destroy.

Australia has a large number of snakes, crocodiles, turtles, and lizards. The lizards include a legless variety and a giant species which grows up to seven feet in length. The country also has some interesting birds. The large emu, which resembles an ostrich, cannot fly but runs very rapidly. The lyre bird imitates the songs of other birds and even some human sounds. A bird which sounds as though it were roaring with laughter is the kookaburra. Australia has many different types of cockatoos and parrots.

Unfortunately, few modern-day Australians see these strange animals in the wild, as they are either becoming extinct or are found only in the more isolated parts of the country.

Map 6 Forests grow only where rainfall exceeds twenty inches a year. It follows that large sections of Australia have few trees and that forests thrive in only scattered parts of the continent. The reliable rainfall necessary to support dense forests occurs in (1) the southwest corner of the mainland, (2) the north, east, and southeast coastal margins, and (3) much of Tasmania.

The type of forests found in these different areas varies according to the climate of each. The continuously hot, wet conditions required by tropical rainforests exist only in the north around Darwin and in the northeast between Cape York and Brisbane. These forests


TROPICAL FOREST (Including Rainforest)
TROPICAL GRASSLAND
TEMPERATE GRASSLAND
TEMPERATE FOREST
DWARF SCRUBS
DESERT
Scale in Miles
0
200
400

Map 6. Natural Vegetation Areas.

resemble the great woodlands of the Congo Basin in Africa, with their many creepers and thick undergrowth. As the rainfall decreases towards the interior, the northern forest lands develop open patches of savanna-type grass. Increasing dryness inland causes a gradual change to tropical savanna (grasslands) and finally, to poor desert vegetation.

The most common type of forest found in Australia consists of trees that are members of the eucalyptus family. Famous examples of this family of hardwoods are the jarrah and karri trees, which often grow to heights of three hundred feet but more often attain a height of about one hundred and fifty feet. Called "gum trees" by the Australians, the Eucalyptus have no branches or leaves on the *Fig. 6-7*

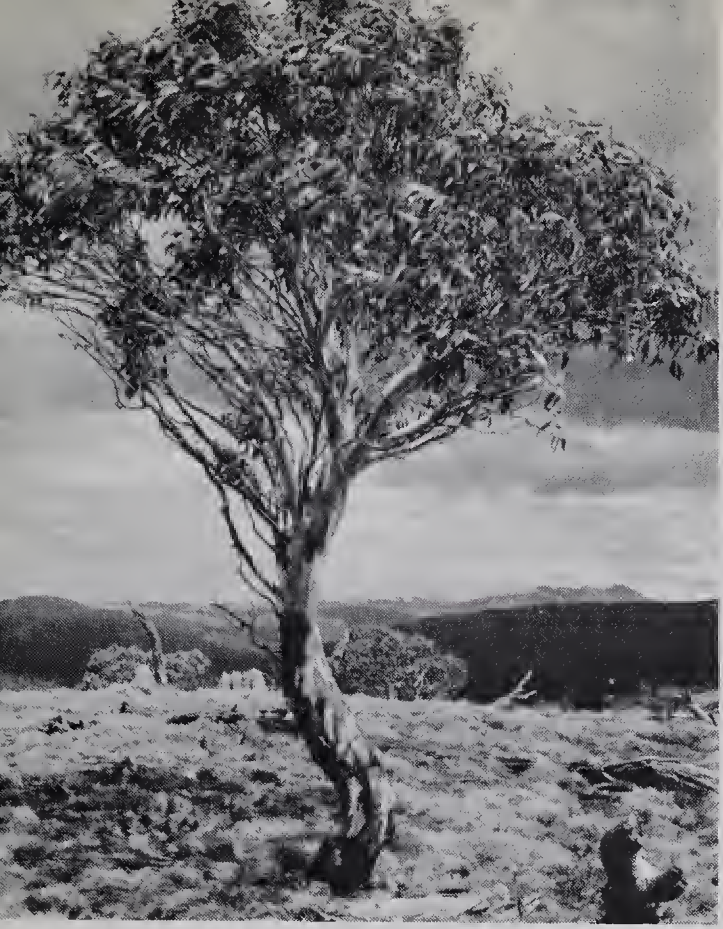


Figure 6. The Snow Gum. *This is one of the many types of Eucalyptus. This species grows on the higher slopes of the Great Dividing Range and is of little value for lumber.*

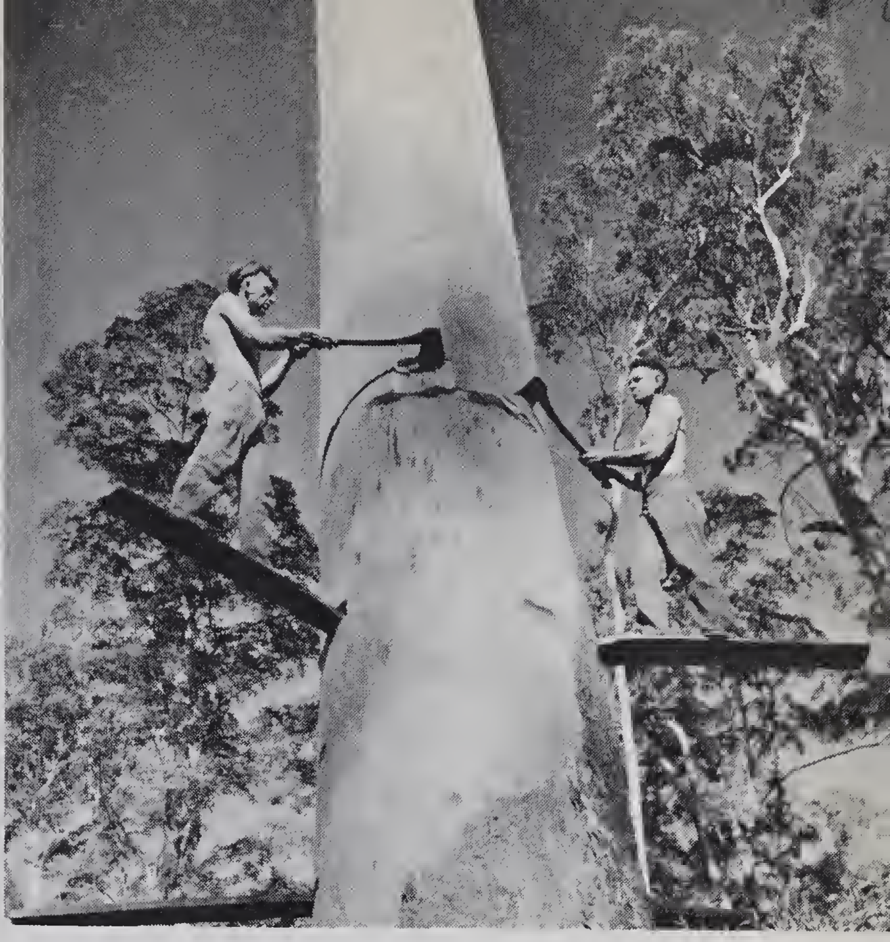


Figure 7. Felling a Gum Tree. *Many gum trees grow to a height of 150 feet; boards are hammered in so that the axemen can stand on them and cut above the lower trunk, which is hard and full of faults.*

lower half of their tall slender trunks. Some members of the family store water in their trunks for use during the dry season, but the most distinctive characteristic of the Eucalyptus is the shedding of their *bark* in winter rather than their leaves, which they keep all year. Large stands of Eucalyptus are found (1) in the southwest corner of Australia, (2) on the damp windward slopes of the Great Dividing Range, and (3) in Tasmania. Because Tasmania has a cooler climate than the mainland, large stands of beech and ash are also common on the island.

The large rainshadow area to the west of the Great Dividing Range is covered with grass. Since temperatures are cooler and the rainfall better-distributed in this area than in the northern savannas, the southern grasslands are of the short, temperate variety. This region is the country's leading area for wheat and sheep production.

The jarrah forests of the Southwest gradually give way to dwarf scrubs, of which the mallee (a small eucalypt) is the main bush.

Further inland, where it is still drier, the mulga bushes (a type of acacia) and salt bushes are more typical. Some tufted grasses grow along the edges of the true desert areas. North of the Great Australian Bight is the large, treeless Nullarbor Plain which is exceptionally dry and barren.

Forestry Australia suffers from a shortage of wood products because good commercial forests cover only one per cent of the continent as compared to approximately 19% in Canada. The tropical and eucalyptus forests of the country do provide some gums, oils, barks for use in tanning leather, and hardwoods for furniture-making; but only five per cent of Australia's trees are softwoods, so that large amounts of paper and softwood lumber must be imported. Some of these imports come from Canada. *Fig. 7*

WORK UNIT 17

The Language of Geography Add to your reference list definitions of the following terms: archipelago, artesian basin, coral reef, oceanic influence, monsoon winds, marsupials, jarrah, karri, mallee, mulga.

Problems and Projects

1. What countries are larger than Australia?
2. When did Australia become a member of the Commonwealth?
3. Find North American cities that have the same latitude north as (a) Hobart, (b) Sydney, (c) Brisbane, and (d) Darwin have south.
4. Seek additional information concerning the strange animals of Australia, with special emphasis upon marsupials.
5. Using suitable reference sources, prepare a short account of the formation of coral reefs.
6. How do many Australian rivers and lakes differ from those in Canada?

Maps

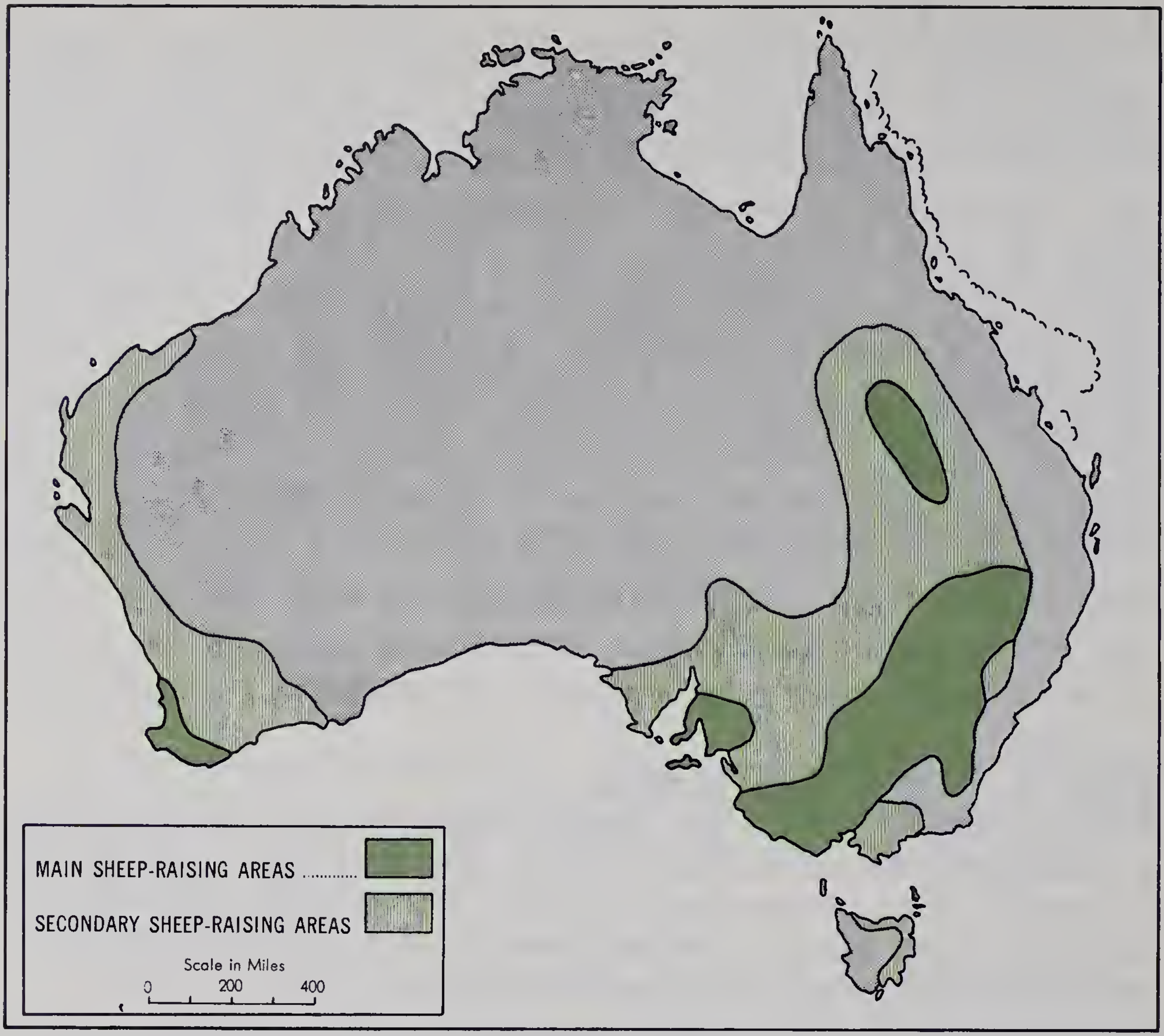
1. On an outline map of Australia, mark the states, the Northern Territory, Canberra, and the chief coastal waters.
2. Mark the rivers, physical features, and lakes on a second map.
3. From the text or an atlas, draw the following maps in simplified form:
   (a) annual rainfall (b) temperature (c) climatic regions (d) vegetation.

RESOURCES

Agriculture Australia's land and climate are definite factors affecting the nature of her agriculture. Except during severe droughts, about one third of the country is good pasture land; but only a few areas are suitable for crop production. The ranches and farms of Australia produce one-half of the country's total national income. The raising of livestock is responsible for three-fifths of this large agricultural production. Australia has well over 150 million sheep, about 17 million cattle (of which about one-third are dairy cows), and approximately 1⅓ million pigs. Indeed, Australia has one-sixth of the sheep of the world, more than any other country, and produces one-quarter of the world's wool. Fully one-half of the nation's total exports consists of wool; most of it is the soft, strong merino wool, which is the best in the world. Australia is also a major exporter of mutton, lamb, butter, and cheese and *Fig. 8*

Figure 8. A Mob (flock) of Sheep.
This is a familiar sight in the southern highlands of New South Wales, a rich grazing area in the shadow of the Australian Alps. Sheep-herding is generally done on horseback, with the help of dogs. These Merino, cross-bred sheep produce very high quality wool, from which the major part of Australian agricultural wealth is derived.

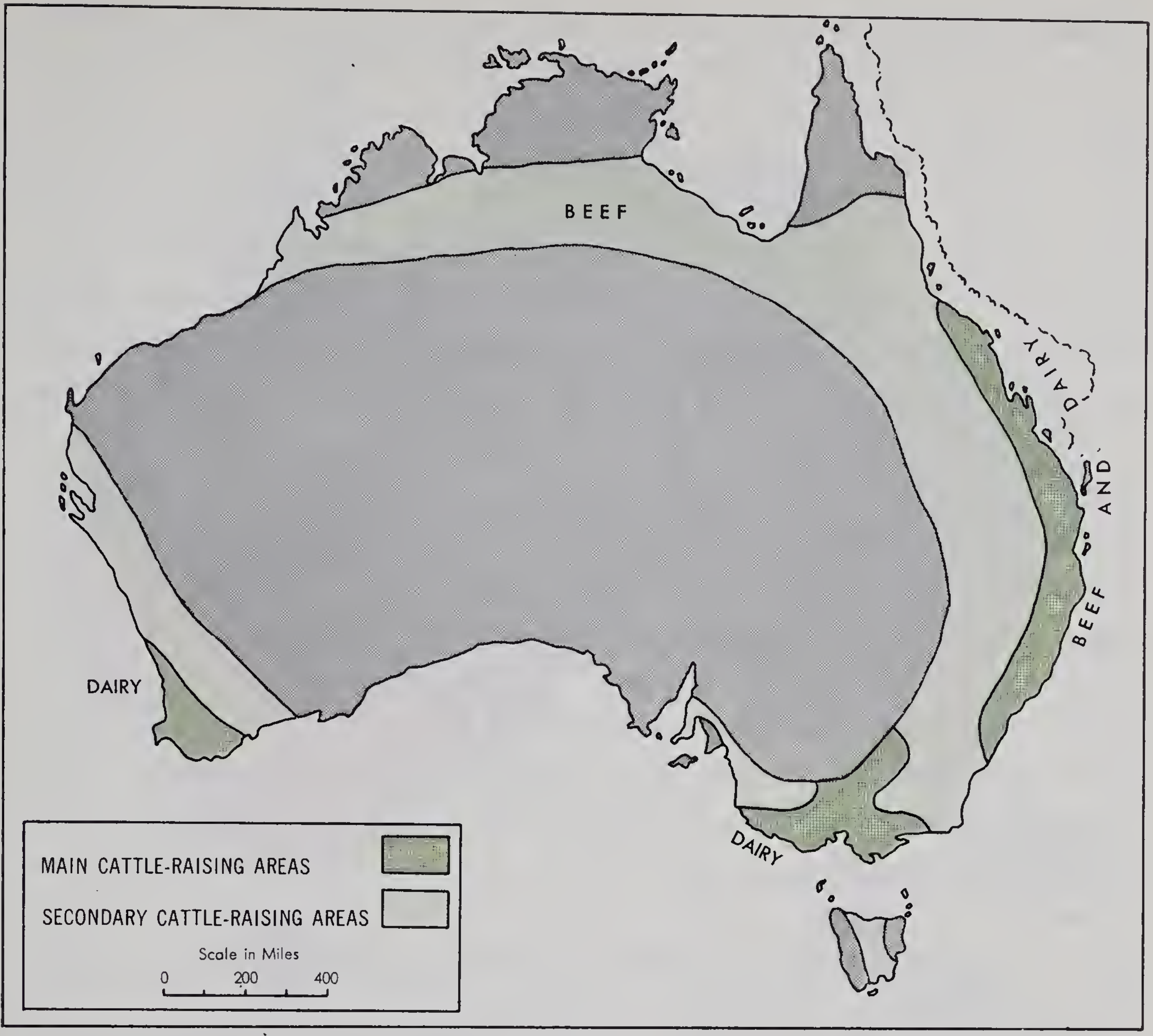
JOUNAMA CREEK


MAIN SHEEP-RAISING AREAS ....
SECONDARY SHEEP-RAISING AREAS
Scale in Miles
0
200
400

Map 7. Sheep-Raising Areas.

ranks second as a world supplier of beef. Despite the great importance of agriculture to Australia, less than one-fifth of the labour force actually work on farms and ranches.

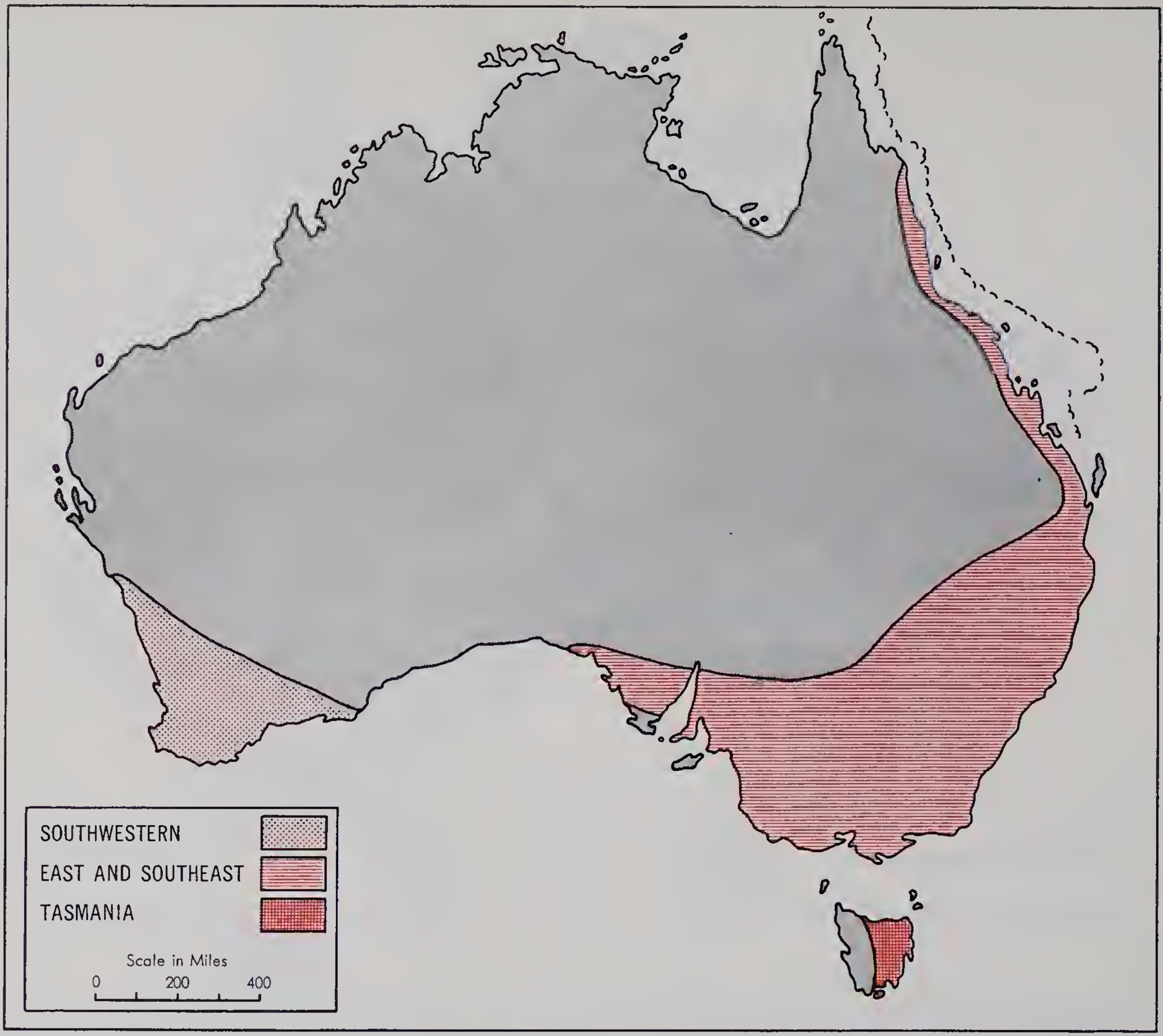
Map 7 The majority of the sheep are raised well inland, in the East and Southeast. Three areas stand out as sheep-raising regions: (1) the wetter parts of the Murray-Darling Basin, (2) the tropical and subtropical grasslands of Queensland, and (3) the well-watered coastland of Victoria and New South Wales. Only in the third region, with its richer pastures, is the emphasis on raising breeds for good mutton rather than fine quality wool. Some of the sheep stations are vast, especially those in the drier inland areas where it sometimes takes up to 30 acres to feed one sheep.


BEEF
DAIRY AND BEEF
DAIRY
DAIRY
MAIN CATTLE-RAISING AREAS
SECONDARY CATTLE-RAISING AREAS
Scale in Miles
0
200
400

Map 8. Cattle-Raising Areas.

Water supply is the main factor deciding the location and size of cattle ranches. The low rainfall of much of Australia creates large areas of grasslands too dry for farming, but adequate for cattle-grazing. Queensland, with its extensive grasslands, is the chief cattle-raising state. The coastal regions of New South Wales and Victoria are also important cattle areas; and there are some raised in the Northern Territory, in the northern part of Western Australia, in the *Mediterranean* climatic regions of Western Australia and South Australia, and in northern Tasmania. Some cattle ranches are even bigger than the large sheep stations. A *typical* northern ranch averages 1,500 square miles, more than one-half the size of Prince Edward Island!

Map 8



Map 9. Main Agricultural Areas.

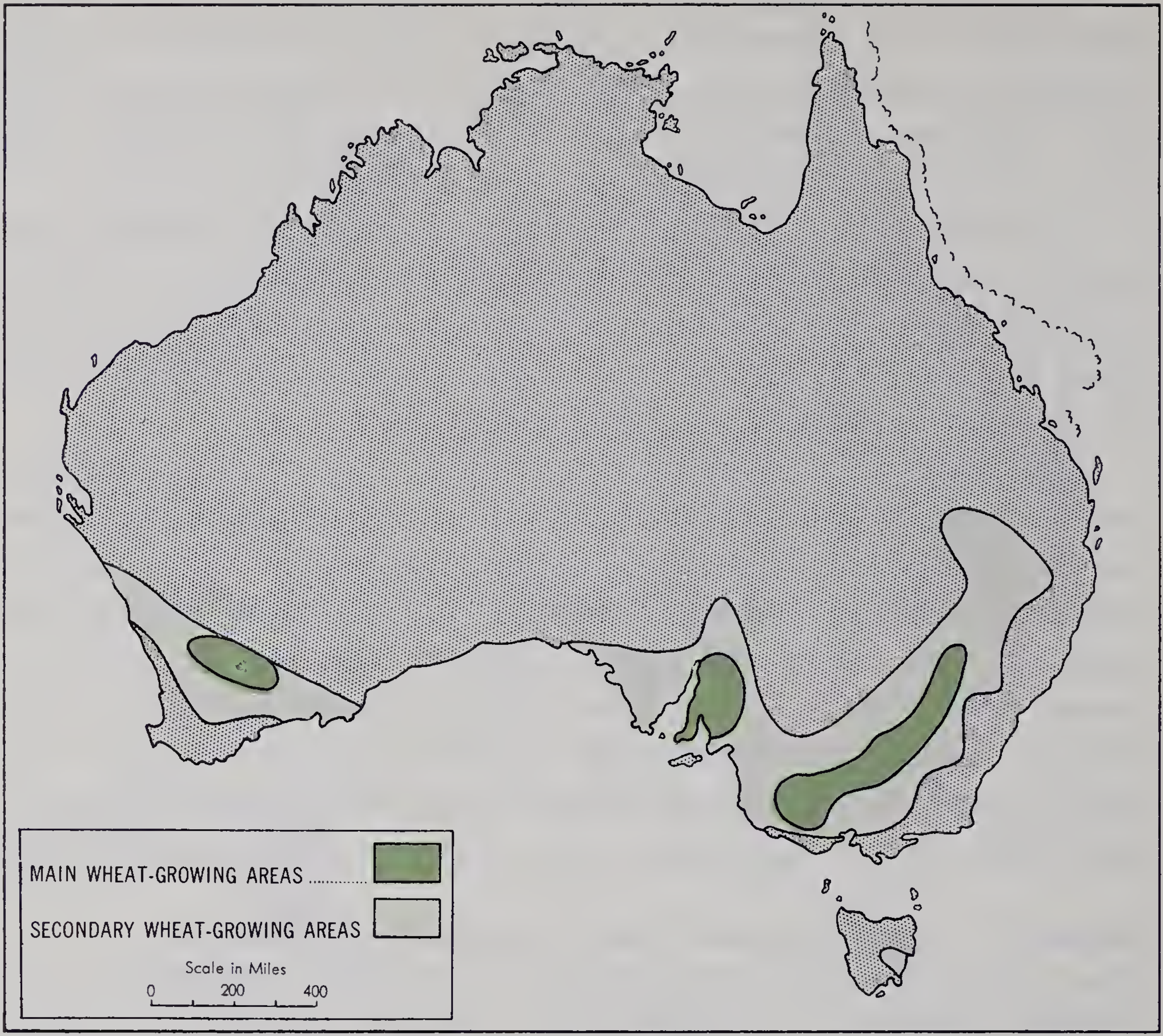
Dairying is limited to irrigated regions of the south and to coastal areas that get enough rainfall to provide good pasture. The chief areas of production are located near Perth in Western Australia and around the large cities in the east and southeast, which provide a large market for dairy products. Victoria, New South Wales, and Queensland are, therefore, the main dairying states, providing over four-fifths of the nation's dairy products.

Although a large part of Australia can be used as pasture land, less than two per cent of the continent is suitable for growing crops. A large percentage could be used if more irrigation projects were developed, but the main handicap to increased irrigation is the shortage of reliable sources of water. The rivers of Australia often run dry; and the underground water, which is found in approximately one-third of the continent, is often too salty for continuous use as irrigation water. Moreover, excessive use of the underground water for irrigation would cause many of the springs and artesian wells that provide water for numerous sheep and cattle to run dry.

At present, almost 1½ million acres are irrigated, of which nine-tenths is watered by the Murray River and its tributaries, the Murrumbidgee and the Goulburn. Roughly two-thirds of the irrigated land is used as pasture or for growing livestock fodder. The rest is used for growing grains, grapes, and citrus fruits.

The country has three main agricultural areas: (1) Tasmania, which is cooler and damper than most of the mainland, specializes in the production of potatoes, apples, and pears; (2) the southwestern corner of Western Australia, which stresses wheat, oats, apples, citrus fruits, and grapes; and (3) the east and southeast coasts from about 15° S in Queensland to the eastern shores of the Great Australian Bight in South Australia. By far the largest and most important, this agricultural area can be further divided into (a) the North, where sugar cane, cotton, tobacco, pineapples, bananas, *Map 9* *Fig. 9*

Figure 9. Harvesting and Crating Pineapples in Queensland.
The tropical and sub-tropical areas in northeastern Australia are important producers of tropical crops, including pineapples, bananas, sugar cane, and tobacco. Reliable, heavy rainfall and careful cultivation by modern methods enable the farmers of this region to produce sufficient crops to satisfy the home market and export canned fruit.



Map 10. Wheat-Growing Areas.

and other tropical crops thrive on the warm, damp coastal plain of Queensland, and (b) the South, where grains; fruits, including those of the citrus variety; livestock fodder; grapes; and a variety of temperate products are grown.

Occupying approximately one-half of the nation's farm land, wheat is Australia's chief crop. Sometimes droughts greatly reduce grain production, but in normal years Australia rates among the world leaders in wheat exports. Other important field crops are oats, barley, hay, corn, and grain sorghum. Some rice is grown in *Map 10* a few irrigated areas of New South Wales. Most of the wheat is grown in those parts of the southeast and southwest which receive moderate rainfall. As in Canada, special types of wheat that will not succumb to disease and weather hazards are used, and extensive use is made of modern farm machinery; but, unlike many Canadian prairie farmers, the wheat farmers of Australia also raise some livestock and rotate wheat with other crops.

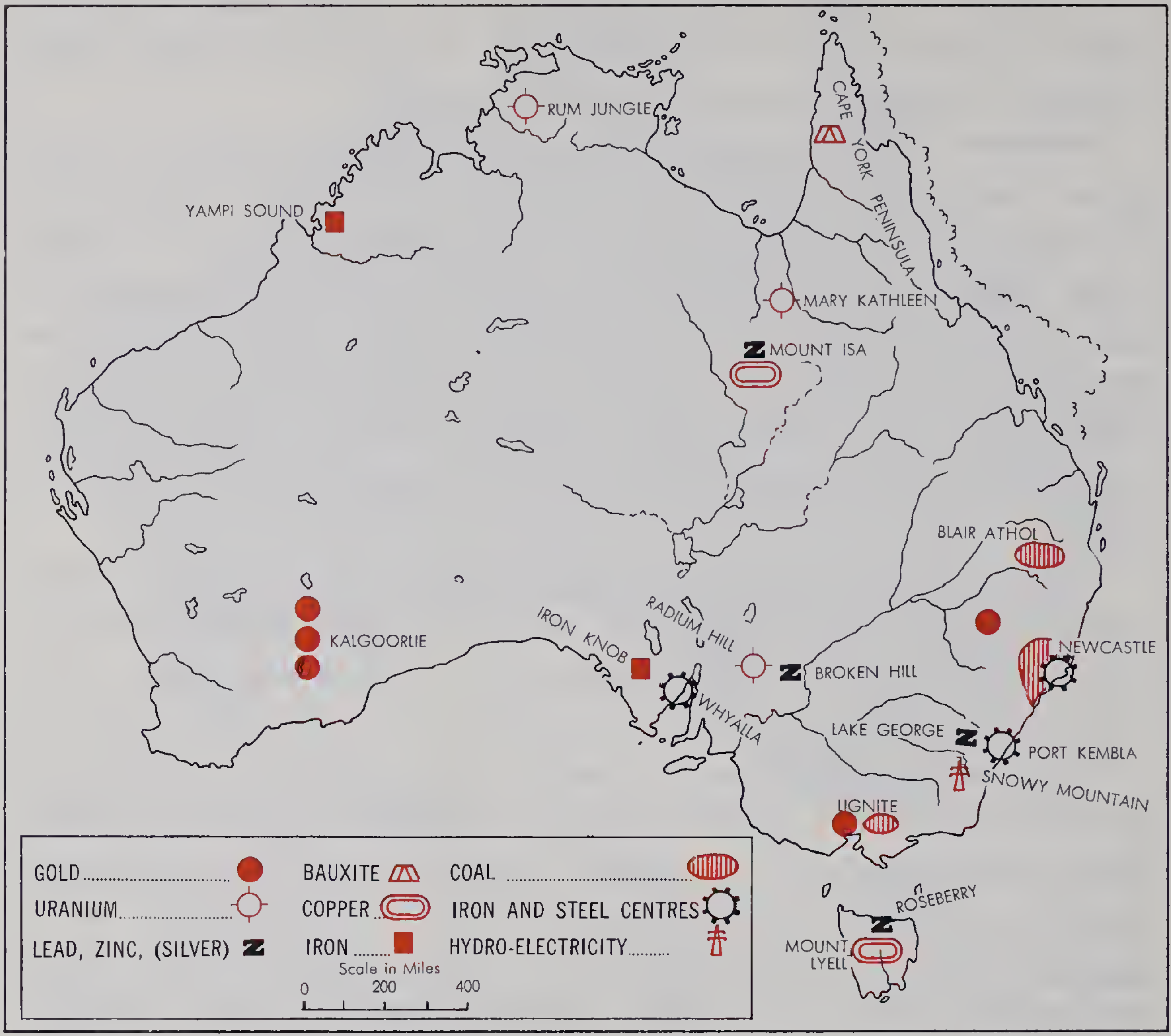
Fisheries Two excellent trawling grounds are located in Australian waters. The one off the coast of southeastern Victoria and the southern part of New South Wales is heavily fished. The other, in the Great Australian Bight, has quantities of fish comparable to those found on good European fishing grounds, but it attracts few fishing vessels because (1) it is a considerable distance from large cities where fish catches could be sold, and (2) suitable vessels with fishing gear adequate for use in the Bight are scarce in Australia.

The principal fish caught in Australian waters, in order of the value of fish landed, are mullet, sea perch, shark, and barracuda. Sea perch, which the Australians call Australian salmon, and barracuda are the two fish most desired by Australian canneries.

The continent also has (1) pearl oyster and turtle fisheries on the north coast, (2) oyster breeding grounds off the shores of New South Wales, and (3) a crayfish industry in the states of South Australia, Western Australia, and Tasmania. The country is the largest producer of pearl shell in the world. Over four-fifths of the sea exports consist of crayfish, the majority of which are sold to the United States. Whaling vessels operate out of some Australian ports. However, the country imports almost as many sea products as it produces.

Minerals Since barren wastelands, too dry and rocky to produce farm crops or forest products, occupy such a large percentage of the country, it is fortunate for Australians that many large deposits of valuable minerals have been discovered. Without the wealth produced by its mines, Australia would be a much poorer land. Australia's many mines are important in the world production of several minerals. Large amounts of coal, uranium, gold, lead, zinc, silver, tin, copper, and iron ore are mined, plus smaller quantities of other minerals. Although all the states of Australia have deposits of coal or lignite, the major fields are in New South

Map 11


RUM JUNGLE
CAPE YORK PENINSULA
YAMPI SOUND
MARY KATHLEEN
MOUNT ISA
BLAIR ATHOL
KALGOORLIE
IRON KNOB
RADIUM HILL
BROKEN HILL
NEWCASTLE
WHYALLA
LAKE GEORGE
PORT KEMBLA
SNOWY MOUNTAIN
LIGNITE
ROSEBERRY
MOUNT LYELL
GOLD
URANIUM
LEAD, ZINC, (SILVER)
BAUXITE
COPPER
IRON
COAL
IRON AND STEEL CENTRES
HYDRO-ELECTRICITY
Scale in Miles
0
200
400

Map 11. Mining and Hydro-Electric Power.

Wales around Newcastle. Queensland ranks second in coal production and has one of the world's largest deposits of soft coal in the Blair Athol area. In the state of Victoria, the world's largest deposits of lignite are found and mined. Australia is one of the largest producers of uranium, which is found at Radium Hill in South Australia, at Rum Jungle near Darwin in the Northern Territory, and at Mary Kathleen in Queensland. This last field is the largest single deposit of uranium ore in Australia.

The Kalgoorlie area in Western Australia is the heart of a gold zone 1000 miles in length and 200 miles in width. Although Western Australia produces three-quarters of the national output of gold, there are also gold mines in all the other states and in the Northern Territory.

As is often the case in other parts of the world, lead, zinc, and silver can be obtained at the same time from several Australian mines. The largest mine of this type is at Broken Hill in New South Wales; and others are located at Mount Isa in Queensland, Lake George in New South Wales, and Roseberry in northern Tasmania. Mount Isa produces two-thirds of the country's copper, and Mount Lyell, in Tasmania, produces copper and gold.

Large iron ore reserves are found at Yampi Sound, in Western Australia, and in the Iron Knob district of South Australia. The latter area produces four-fifths of the nation's iron ore. *Fig 10*

A bauxite deposit which is thought to be the largest in the world is being developed on the Cape York Peninsula of Queensland.

Power Since Australia has few rivers with the qualities necessary for hydro-electricity production — steadiness and speed of flow — most of the electricity is produced in thermal plants that burn coal or lignite. Only the Eastern Highlands provide good

Figure 10. Iron Mine, South Australia.
This mine, known as the Iron Monarch, is in the Iron Knob area of South Australia. This dry region is useless for farming and supports very little natural vegetation, but it is the source of some of the richest iron ore in the world. The ore is carried by rail to Whyalla, from where it is shipped over 1,000 miles by sea to the industrial cities of New South Wales.

power sites for the development of hydro-electricity. Several of these power sites have been developed in a billion-dollar project called the Snowy Mountain hydro-electric scheme, which is located in the Eastern Highlands south of Canberra. When completed in 1975, this huge undertaking will enable Australia to generate over half again as much electricity as she produced in 1958. The scheme also includes the diversion of water from the eastern side of the highlands to the drier western side, where the water will irrigate at least a thousand new farms in the Murray-Darling Basin.

Map 11

Fig. 11

In 1962 oil was discovered in Queensland. Development of the Moonie oilfield should lessen Australia's dependence on imports of this power source. The large uranium deposits offer the long-term possibility of the development of atomic powered generating stations.

Figure 11. The Snowy Mountain Project.
The Adaminaby dam, covering the old pioneering town of Adaminaby, will take years to fill and is only a part of this huge scheme. This project, involving the diversion of a river, will provide irrigation for a large area of the farmlands west of the Great Dividing Range and hydro-electric power for industry.

INDUSTRIES

Manufacturing Manufacturing is the most important single industry in the Australian economy, since it employs more than one-quarter of the working population and provides half of the total value of goods produced in the country. The products manufactured are made mainly for use by Australians, only about one-tenth of manufactures being exported.

Because electricity produced from coal is the main source of power for industry, New South Wales, which is the leading coal-producing state, leads in industrial activity, followed closely by Victoria, which gets electric power by using its large lignite (brown coal) reserves. Together, these two southeastern states produce three-quarters of the nation's manufactured goods. Manufacturing is concentrated in or around the capitals of the six states, i.e. Sydney in New South Wales, Melbourne in Victoria, Adelaide in South Australia, Brisbane in Queensland, Perth in Western Australia, and Hobart in Tasmania. This concentration is due to the availability on the coasts (where the capitals are located) of power, cheap transportation, raw materials, and people to work in the factories and to buy the products manufactured.

Australian manufacturing falls largely into two main categories — (1) the production of industrial metals (about two-fifths of factory production), especially iron and steel, and (2) the processing of Australia's many agricultural products into goods ready for sale, such as the preserving of meat from the country's many sheep, cattle, and pigs; the tanning of cattle hides; the production of textiles and clothing from Australian wool and cotton; the milling of wheat into flour; the refining of cane sugar; and the making of wine from Australian grapes.

In addition, Australia produces trucks, cars, planes, ships, and diesel locomotives as well as a host of smaller industrial products. *Fig. 12*

The Steel Industry Because its power and raw materials are favourably located, Australia can produce steel very cheaply. There are modern, efficient steelworks at Port Kembla and Newcastle in New South Wales. Large supplies of good coking coal are available in the area around these two centres. Iron ore is obtained from

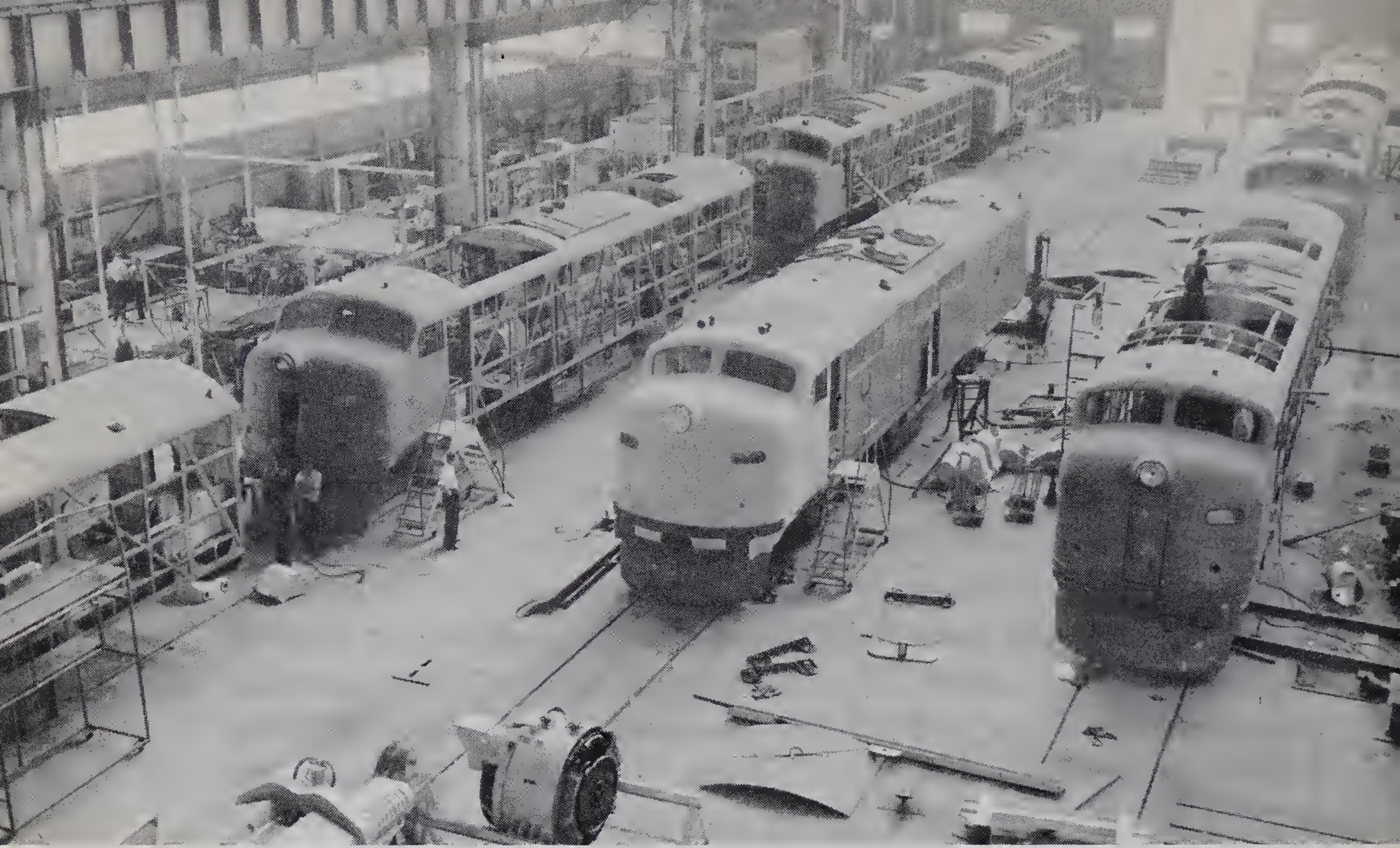


Figure 12. A Diesel-locomotive Plant in New South Wales. *Australia is now among the most industrialized nations of the world, but most industrial output is for the home market. Cars, trucks, planes, and ships are among the other products of Australia's booming manufacturing industry.*

Yampi Sound in Western Australia and Iron Knob in South Australia. Ore from the latter source, which is the most used, is converted into pig-iron in the blast-furnace at Whyalla in South Australia. Ships take coke from New South Wales to Whyalla for the blast-furnace and bring back iron for the steel-works. Sufficient limestone and most alloying materials, except nickel and refined tungsten, are obtained in adequate amounts right in Australia.

WORK UNIT 18

The Language of Geography Add to your reference list definitions of the following terms: Merino sheep, sheep station, sea perch, crayfish, thermal power, lignite, coking-coal, soft coal.

Problems and Projects

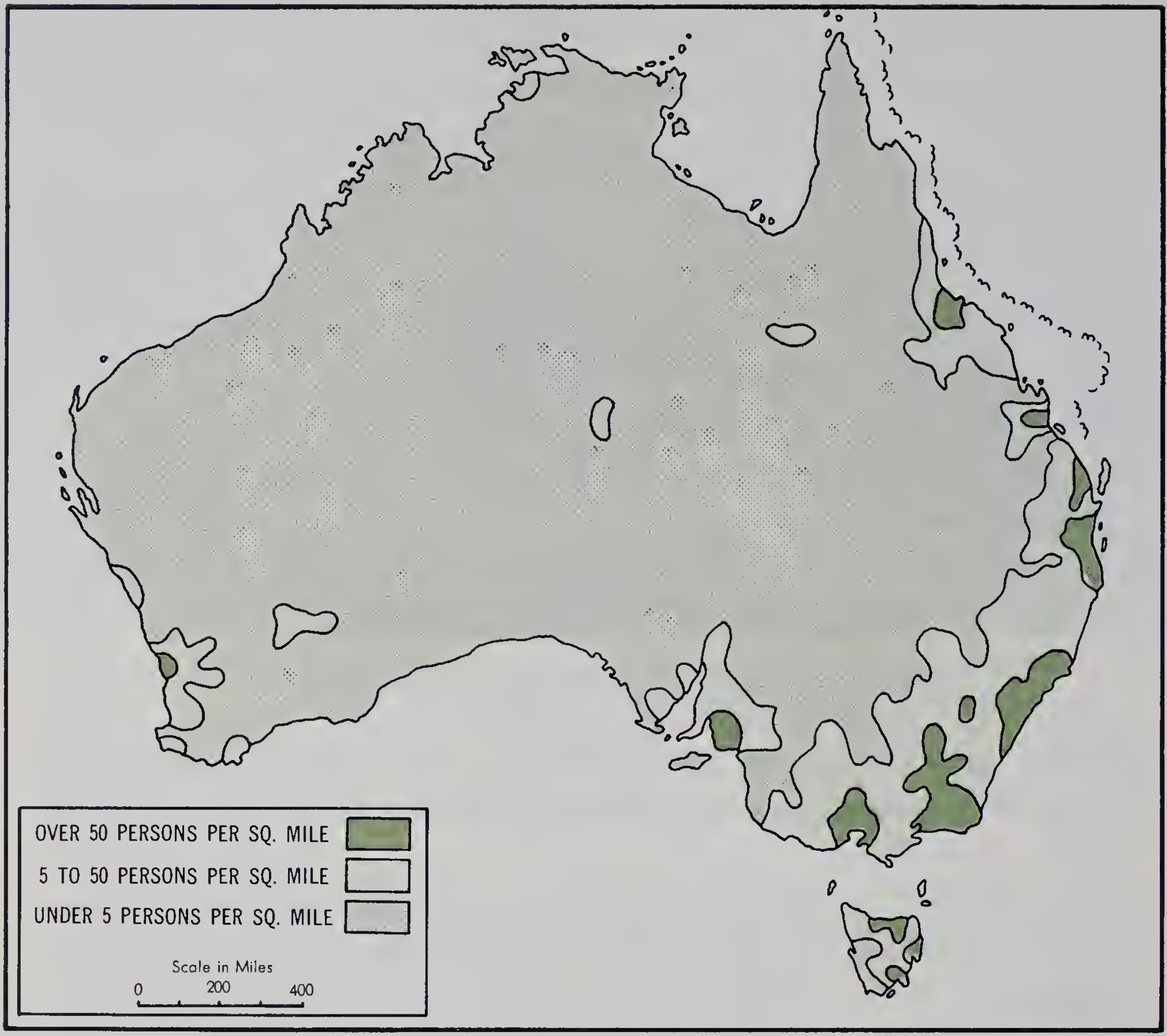
1. Obtain total world production figures for (a) wheat, (b) wool,

and (c) beef; together with the latest Australian production of these products. Construct three pie graphs showing Australia's share of world production for each of these items.

2. Compare the irrigation methods used in Australia with those used in Egypt.
3. To what practical use are the various minerals produced in Australia put?
4. How does the size of Australian cattle and sheep ranches compare with the size of ranches on the Pampas of Argentina and the prairies of the United States and Canada?
5. Describe the livestock industry in Australia.
6. Account for the difference in the availability of hydro-electric power in Canada and Australia.
7. In what ways are the Snowy Mountain project of Australia and the Kitimat power project of British Columbia similar?
8. Compare the significance of manufacturing to Australia with the importance of manufacturing to Canada.
9. What factors that have made Sydney in Nova Scotia a steel centre have also helped to develop the steel industry around Sydney in New South Wales?
10. Why are the Dogger Banks in the North Sea more heavily fished than the fishing grounds off the coast of Australia?

Maps

1. On small outline maps of Australia shade in the areas important for (a) sheep, (b) cattle, and (c) wheat.
2. On another map mark the location of the chief mining centres and of the Snowy Mountain Project.
3. Draw a sketch map which explains the sources of raw materials and transportation routes used by the steel industry.


OVER 50 PERSONS PER SQ. MILE
5 TO 50 PERSONS PER SQ. MILE
UNDER 5 PERSONS PER SQ. MILE
Scale in Miles
0
200
400

Map 12. **Distribution of Population.**

THE PEOPLE

Density and Distribution Several factors have combined to limit the size of the population: (1) the huge desert and semi-desert lands support very few inhabitants, (2) unlike South America and Africa, Australia has no high land in the northern tropical areas to reduce temperatures, and thus make it more attractive to settlers, (3) the main mountain areas are located in the mid-latitudes, where lowlands would be of more value. The continent of Australia, with an area of almost three million square miles, supports approximately 10 million people. The resulting density, three persons per square mile, is the lowest for any of the inhabited continents, and few countries in the world have such a light density of population.

The only well-populated sections of the continent are the southeastern and southwestern corners, where pleasant temperatures and reliable rainfall combine to create attractive surroundings. Most of the interior of Australia is a thinly populated area of huge pastoral stations, dotted here and there by mining centres. At least 95 per cent of the people live in the wetter areas of temperate Australia. Victoria, New South Wales, and Tasmania are the most densely populated states, while the rest of the states all have fewer than two persons per square mile. *Map 12*

Another interesting feature of population distribution in Australia is that two-thirds of the people live in cities and towns and over half (54%) of them live in the state capitals.

Racial Background, Religion, and Standard of Living Over 99 per cent of the people are European in origin, most of them being of British descent. The high proportion of whites is due mainly to two factors. First, there were only about 150,000 natives in Australia when the first European settlers arrived, and their numbers have since been reduced to about 70,000. Second, since the latter half of the 19th century, the government has followed a "white Australian policy", whereby only white immigrants are allowed to come to Australia. This is done because the white Australians fear that if large numbers of nearby peoples (e.g. Chinese and Pacific Islanders) are allowed to come to the country, they will cause social, defence, labour, and economic problems.

Almost all Australians are Christians; the majority are Protestant, though there are over two million Roman Catholics. In addition, there are a few thousand people who practice the Jewish faith and several thousand aborigines who still follow their native religion.

The white people of Australia live much the same as do Canadians, with a few minor exceptions. They speak English with what most Canadians would call an English accent. A typical Australian living in Sydney or Melbourne leads much the same life as a typical Canadian living in Montreal or Toronto.

The Australian standard of living, long higher than that of Great Britain, is one of the highest in the world. Today, one Australian in four has a car, and three-quarters of all Australian city kitchens have refrigerators. Australians eat more meat than anybody else in the world (nearly 300 lbs. a-piece per year) and have higher per capita incomes than almost anybody else outside Canada and the United States.

Aborigines When the Europeans began to settle Australia, there were only about 150,000 natives (now known as aborigines) living on the continent. At first, they were thought to be very unintelligent and backward compared with other primitive peoples, because most of them wore no clothes, had no villages, grew no crops, had not developed the bow and arrow, and tended no herds. They wandered from place to place hunting small game and gathering edible plant roots, berries, seeds, crabs, shellfish, bulbs, and honey-ants. Their main possessions were spears, spear throwers, stone knives and axes, and wooden or bark dishes. Some of the tribes had developed shields, boomerangs, canoes, huts, nets, and baskets.

Figure 13. Aborigines at a Settlement in the Northern Territory. *Although several thousand aborigines still wander in the desolate dry-lands, many now live on government settlements or work as herdsmen on sheep and cattle stations in the "outback". Those who have left the primitive life of their ancestors have adopted many of the ways of the white Australian.*

Scientists have now decided that the aborigines were retarded, not by lack of intelligence, but because of their environment. The white man has not been able to originate anything from the Australian environment. He has not domesticated an Australian animal for herding or developed any native Australian plant for crop production. The wandering habits of the aborigines were, therefore, an essential adjustment to the drought-prone land in which they lived. There were no animals that they could domesticate, and, if they had remained in one place too long, the supply of game and plant life would have been exhausted.

The tribesmen had developed a complicated social system which included a controlling of greed, and the practice of temperance, generosity, and peaceableness. They had developed an amazing ability to track animals and invented two weapons—the boomerang, and a spear thrower which worked on the principle of a lever—both unknown to other primitive tribes.

Today there are only about 70,000 pure aborigines and people with some aboriginal blood. About half of them wander in central, north, and western Australia as they did before the coming of the white man. The other half live in or near settlements. Many now work as stockmen on cattle and sheep stations in the "outback," or remote, country. A few have gone to the cities to work as miners and factory hands. *Fig. 13*

Cities *Sydney:* The site of Sydney offered many advantages for the development of a major city and port. The inlet beside which Sydney has grown, Port Jackson, provides shelter and deep water for ocean-going vessels. This fine natural harbour was formed long before the white man arrived in Australia, when a many-branched valley lying at right angles to the shoreline sank below the level of the ocean and was "drowned" with sea water. The deep bay so formed is one of the world's finest harbours, providing 180 miles of water frontage capable of accommodating the largest vessels. Of the other Australian ports, only Melbourne can compare with it. Since Port Jackson was the best harbour on the east coast, Sydney became the chief distributing and trading centre for the mining and agricultural regions which developed in New South Wales. *Map 1* *Fig. 14*

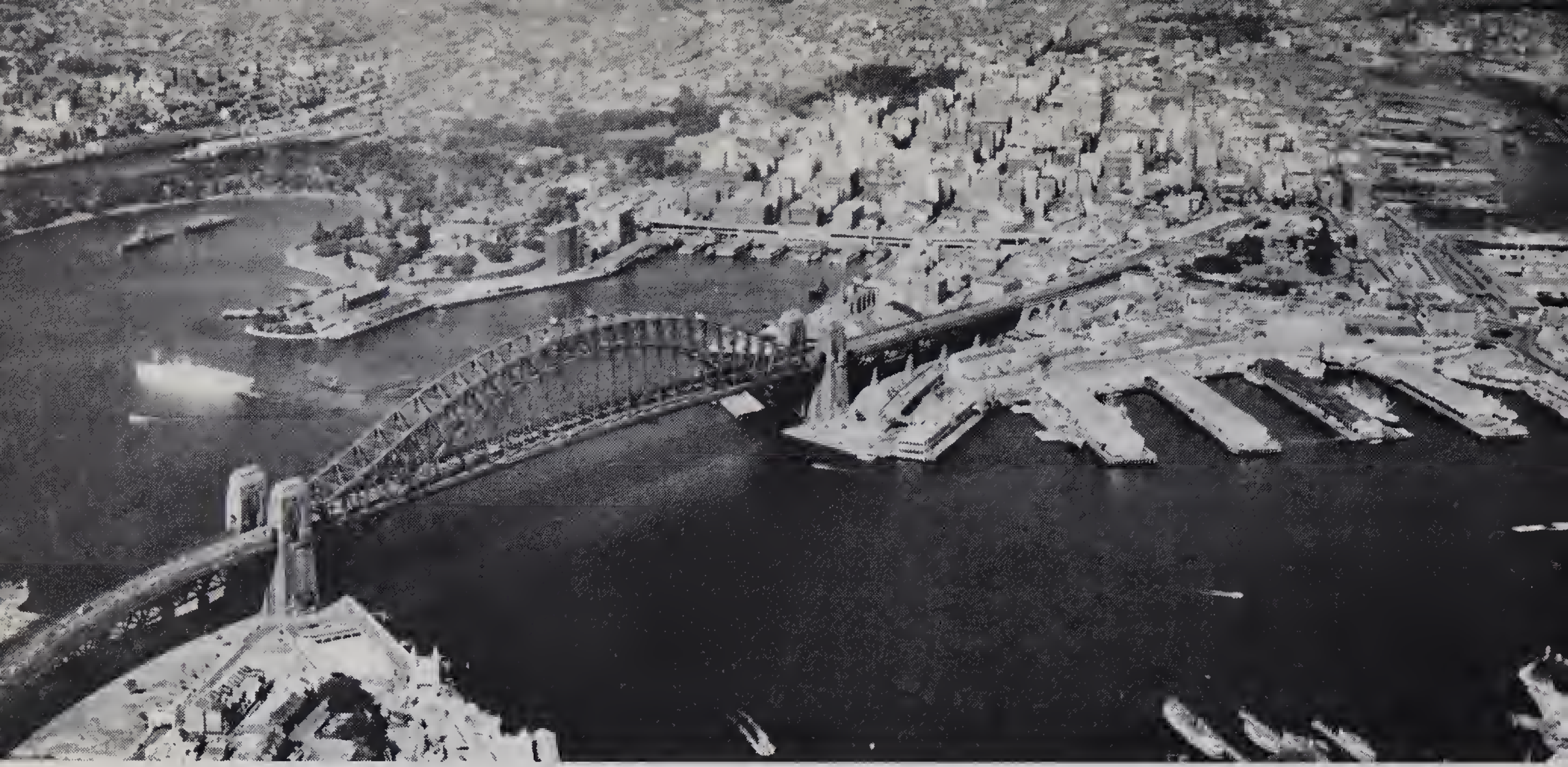


Figure 14. Sydney Harbour.
This sheltered natural harbour, dominated by its famous bridge, is one of the finest in the world, with wharf facilities for a large number of ships. The harbour, and its productive hinterland, have enabled Sydney to become the centre of commerce, industry, and culture in Australia.

A *hinterland* is the area lying inland from a port which (1) supplies the majority of the goods exported through the port and (2) receives most of its imported supplies through that port. No seaport can become great unless it serves a prosperous and well-populated hinterland. Sydney is fortunate to have a hinterland which includes several important agricultural regions and mining centres. One of Sydney's principal functions is to ship the farm products and minerals produced in these areas and to receive and deliver to them the manufactured goods that they require from other areas. Lying within the lands served by Sydney are several farm regions on the eastern coastal plain that specialize in dairy products, fruits and vegetables, and much of the vast wool and wheat lands beyond the mountains west of the city. Although no easy gaps exist in the mountains separating Sydney from the interior, three passes do provide access to the open grasslands of the interior.

Although its emergence as a leading port explains much of Sydney's present greatness, it was not the only factor that stimulated the development of Sydney into Australia's largest city. Its choice as the capital of New South Wales has made Sydney an important administrative centre, and its location in the most densely populated section of the continent has made it a centre of trade and manufacturing. The city and its suburbs have a population of over two million people providing workers for the factories and consumers to buy the goods manufactured. Raw materials and fuels are easily obtained, either through Port Jackson or from the huge coalfield that underlies the areas north and south of Sydney. Many of the industries that have grown in the city are, of course, based upon the agricultural and mining products that Sydney obtains from her own hinterland. The city's main industries are car assembly, cotton and wool processing, clothing, chemicals, machinery, and food products.

Melbourne: the capital of Victoria, is built at the north end of Port Phillip Bay, which provides an excellent harbour. Its exports of wool, gold, meats, and manufactured goods sometimes surpass the tonnage handled by Sydney. Engineering and textiles, especially wool, cotton, and rayon yarns and fabrics, are the most important of many industries located in the city or its suburbs. With about 1,907,000 inhabitants, Melbourne is second only to Sydney in size.

Brisbane: the capital of Queensland, is located near the mouth of the Brisbane River. It is a busy port and an important engineering centre. The population of Brisbane is 620,000.

Adelaide: the capital of South Australia, is located on the Torrens River about seven miles from its port, Port Adelaide. It is important in the export trade, rating fourth among Australian ports in tonnage handled. Greater Adelaide, with its 588,000 people, contains over half the population of the entire state of South Australia.

Perth: the capital of Western Australia, has grown along the banks of the wide Swan River. With its suburbs, including the port of Fremantle, the city has a population of about 420,000. Greater Perth has car assembly, clothing, chemical, and furniture factories. Since it is the only large city in Western Australia, Perth has become a trading centre for a large wool, wheat, and mining area. It is a beautiful city, with excellent beaches and a marvellous climate, receiving an average of eight hours of sunlight a day.

Map 11 *Newcastle*: the second largest city of New South Wales, has a population of about 203,000 when its suburbs are included. It rates with Brisbane as a major port largely because it exports considerable amounts of coal and receives raw materials for the local iron and steel industries.

Hobart: the capital of Tasmania, has about 145,000 people. Located on the Derwent River, it has a good harbour through which it exports grain, wool, timber, minerals, and fruit. It has sawmills, flour mills, tanneries, iron foundries, woollen mills, and a zinc smelting plant.

Darwin: the capital of the Northern Territory, has only about 12,000 people; but, since it has a good harbour, it is the main supply and shipping centre in the north.

Canberra: the capital of the Commonwealth of Australia, is strictly an administrative city, the entire population of the city and district being only 56,430. Like Washington, the capital of the United States, Canberra is a completely “planned” city.

Other important cities of Australia are *Woolongong* (New South Wales), *Geelong* and *Ballarat* (Victoria), *Launceston* (Tasmania), and *Townsville* (Queensland).

TRANSPORTATION AND COMMUNICATIONS

Railroads Only Canada has more miles of railway per person than Australia. However, when compared with other countries in terms of area, Australia surpasses only Brazil and Egypt. For example, Australia has a little over nine railway miles per 1000 square miles, compared with over 220 per 1000 square miles in Great Britain and Ireland. The apparent contradiction in these figures is easily understood when you consider the nature of the country. Only in the extreme southeast and southwest is there enough population to justify a dense network of railways. The small number of people combined with the size of the country explains why the per capita railway mileage is so high.

Almost 25,000 of the 28,000 miles of railway belong to the individual state governments. Almost all of these railways radiate from the state capitals, which are, in most cases, the main seaports. The states built their railways independently, with the unfortunate result that they were made different widths, making it necessary to unload and reload goods when crossing a state border. A programme to standardize railway gauges (widths) and to replace steam with diesel-electric engines is now under way.

Roads Australia has over half a million miles of roads, but, as in the case of railways, they are numerous only in the east and southeast. Paved highways link most of the large cities, but outside the settled rural areas roads are poor. The roads in the remote "outback" parts of the country are often just trails. The country has the fifth largest number of motor vehicles in the world, exceeded only by the United States, Great Britain, Canada, and France.

Shipping *Inland Shipping* — Since the rivers of the north are often violent and those in the rest of the country have an unsteady flow, inland water transport is of minor importance in Australia. Even the Murray-Darling system is severely handicapped by (1) a seven-month navigation period on the Murray, (2) very irregular flow of the Darling, (3) sandbars at the mouth of the Murray, blocking ocean traffic, and (4) economic preference given to state-owned railways.

Coastal Shipping — Since the main cities are well separated and are also ports, and since shipping costs are much cheaper than either rail or road transportation costs, interstate shipping is largely carried on by ocean vessels. The roads and railways, in many cases, only serve as feeders for coastal shipping.

Airways Australia has a comparatively well-developed network of airlines, all major cities being connected by air routes. As in the case of the Canadian northland, airplanes are very valuable in maintaining a link between the remote parts of the country and the more populated areas.

Communications Like other advanced countries, Australia has a modern and well-developed system of communications. Adequate postal, newspaper, telephone, telegraph, radio, and television services exist in the settled parts of the country but are unavailable in the vast unpopulated regions of the island-continent. One of the most interesting uses for radio is found in the isolated "outback", where it provides, to remote settlements, contact with the Royal Flying Doctor Service.

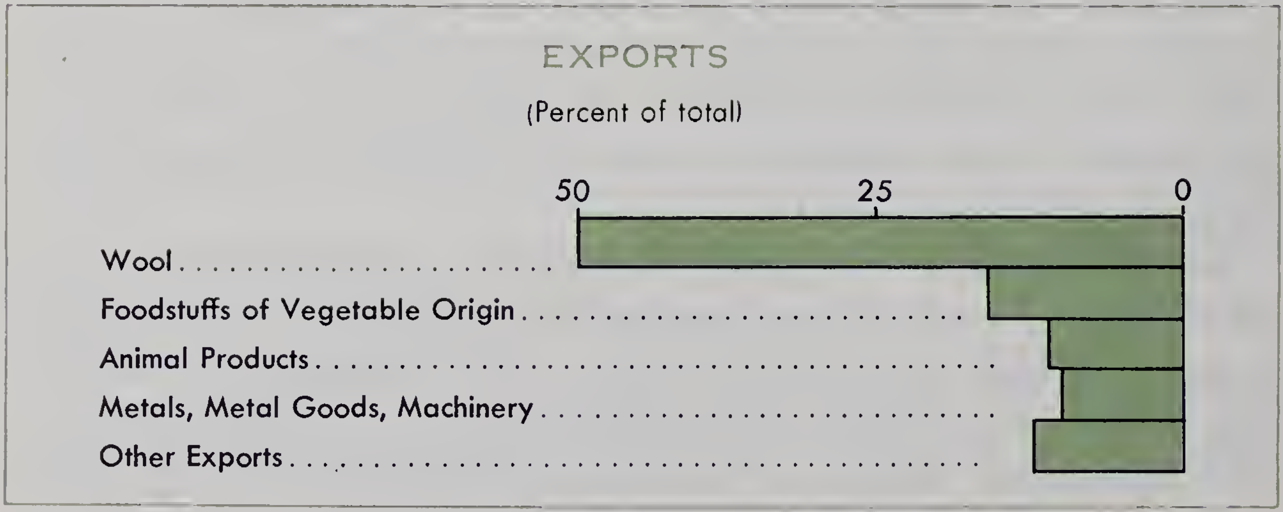
FOREIGN TRADE

Fig. 15 Study the "Exports" and "Imports" graphs below. Note the outstanding importance of wool among Australian exports. Wheat, flour, cane sugar, fruits, and wine are the chief "foodstuffs of vegetable origin" exported; and meats, butter, hides, and skins are the main "animal products" sold abroad. Australia competes with Canada as a world exporter of wheat, flour, meats, butter, and mineral products.

The United Kingdom buys over one-third of Australia's exports. Other good customers are Japan, the United States, New Zealand, Canada, and several members of the European Common Market. However, Canada normally buys only two per cent of Australia's total exports. Our purchases consist mainly of raw sugar, raisins and currants, wool, meats, canned fruits, and coconut oil.

More than a third of Australia's imports come from the United Kingdom. Other suppliers include the United States, West Germany, Indonesia, Japan, and Canada. However, only about three *Fig. 16* per cent of Australia's imports normally come from Canada. Our sales to Australia consist mainly of newsprint, automobiles and parts, aluminum, lumber, asbestos, drugs and chemicals, iron and steel, and wood pulp.

Figure 15. Exports.



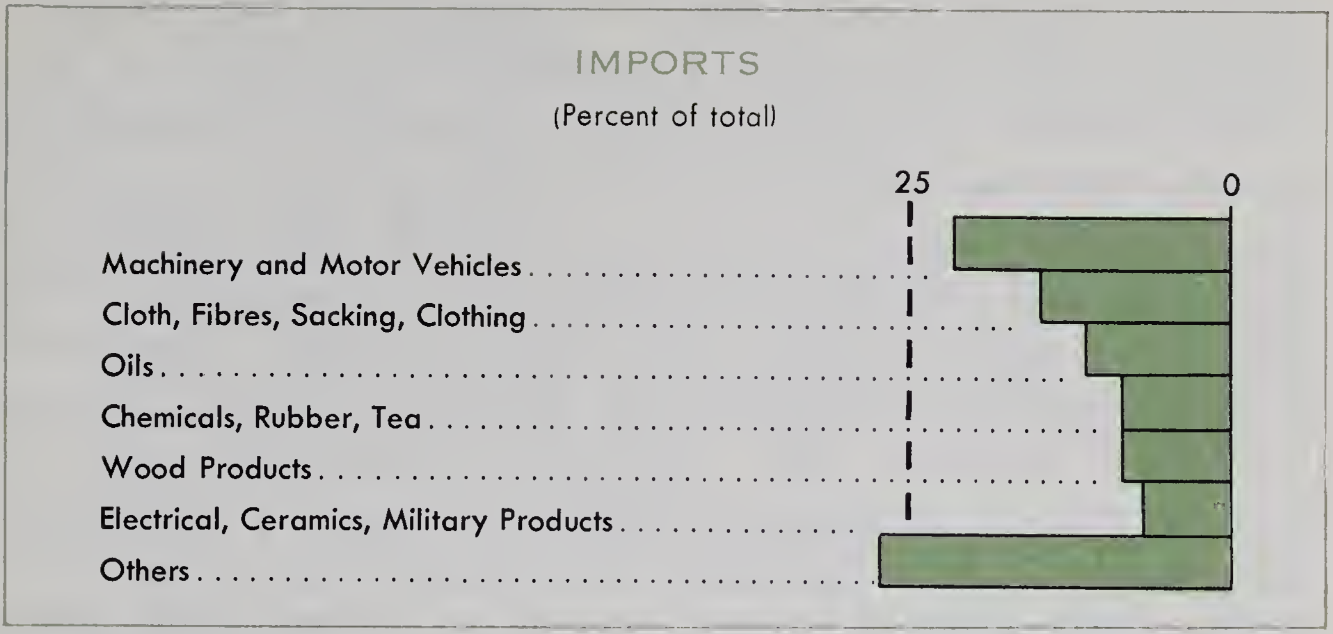


Figure 16. Imports.
Australia's exports are still dominated by primary products with wool accounting for half the total value. The imports are largely manufactured or processed items. In this respect Australia's trade pattern is much like that of Canada.

A weakness in Australia's trade position is created by periodic droughts and floods, which often greatly reduce the amount of produce which she has to export in any given year. She may be a big exporter of wheat one year then have to import wheat the following year.

PROBLEMS AND CONCLUSION

The thousands of miles that lie between Australia and the other advanced industrial nations of the world create the country's chief problem. The high standard of living which exists in Australia keeps the cost of the country's products so high that the neighbouring Asian countries are unable to buy many Australian exports. The wealthier industrial nations of North America and Western Europe, therefore, buy most of Australia's exports. Transportation charges to these very distant countries add greatly to the cost of Australian goods and make it more difficult to keep prices low enough to ensure the sale of exports.

Australia, like Canada, suffers from a shortage of people for its usable area. The continent could support a larger population if irrigation projects were developed in parts of the huge drylands. A larger population would (1) provide more customers for Australian products, (2) make available more workers to develop the nation's minerals, and (3) reduce the threat of invasion by any of the overcrowded countries of Asia, who look with envy on that underpopulated continent. Australia has an immigration policy designed to attract as many white settlers as possible. People considered desirable as immigrants get assistance in paying for their passage to Australia. After they arrive in the country, they are allowed to live in government lodgings for up to two years, while they look for suitable jobs and satisfactory private housing. Immigration from Britain is strongly encouraged. British youths under twenty-one get free passage to Australia and a weekly allowance until they get settled. Australian citizens are constantly urged to convince relatives and friends in Britain that they should move to Australia.

As in the case of Canada, however, there is also the danger of allowing the population to grow so large that the available resources cannot support the inhabitants at a reasonable standard of living. Only 1½ per cent of Australia is suitable for raising crops, and the amount of water available for increased irrigation is definitely limited. It is doubtful, therefore, whether the continent could support more than 30 million people at a decent standard of living.

Despite its location in the Eastern World, Australia can be classed as a member of the Western World. In social, economic, and political matters Australia is very similar to Western Europe, the United States, and Canada. The Europeans who have settled and developed Australia have created a civilization in their huge dry country which is very similar to the European civilization from which they came.

WORK UNIT 19

The Language of Geography Add to your reference list definitions of the following terms: White Australian Policy, aborigines, boomerangs, spear-thrower, outback, railway gauge, hinterland.

Problems and Projects

1. Construct two bar graphs: one illustrating the total population of all countries with an area in excess of one million square miles; and the other graph illustrating population density in the same countries.
2. Prepare a small illustrated booklet portraying the primitive life of uncivilized Australian aborigines.
3. Compile a detailed list of goods that Canadian importers buy from Australia and a similar list of goods that Canadian exporters sell to Australia.
4. Why is it more difficult to provide good transportation in Australia than it is in England?
5. Why do more people live in the comparatively small British Isles than in huge Australia?
6. Compare the Aborigines of Australia with the Eskimos of Canada under the headings (a) food, (b) weapons, and (c) homes.
7. What geographical factors that stimulated the growth of Montreal in Canada also affected the development of Sydney in Australia?

Figure 17.
Great Grey Kangaroo.

There are many different types of kangaroo, varying in colour and size. When sitting upright, the kangaroo partly rests on its strong, muscular tail, which is also used for balancing when it walks on four feet. The kangaroo usually progresses by leaping on its strong hind legs. Most of the kangaroos feed on grass and the young shoots of bushes.

8. Why do the United Kingdom and the United States have a greater density of railways than Australia?
9. Why does Australia sell more of her products to the distant countries of Western Europe and North America than she does to the closer countries of South Asia?
10. Because of the difference in climate, what products can Australia produce for export that cannot be grown in Canada?
11. Which of the problems now facing Australia will most hinder her future growth?

Maps

1. On an outline map of Australia indicate:
   (a) the areas of heaviest population
   (b) the largest cities
   (c) the principal railway lines

REVIEW QUIZ—AUSTRALIA

Select the correct answer for each question. Copy the complete question into your notebook. List the page number of your text which supports your answer.

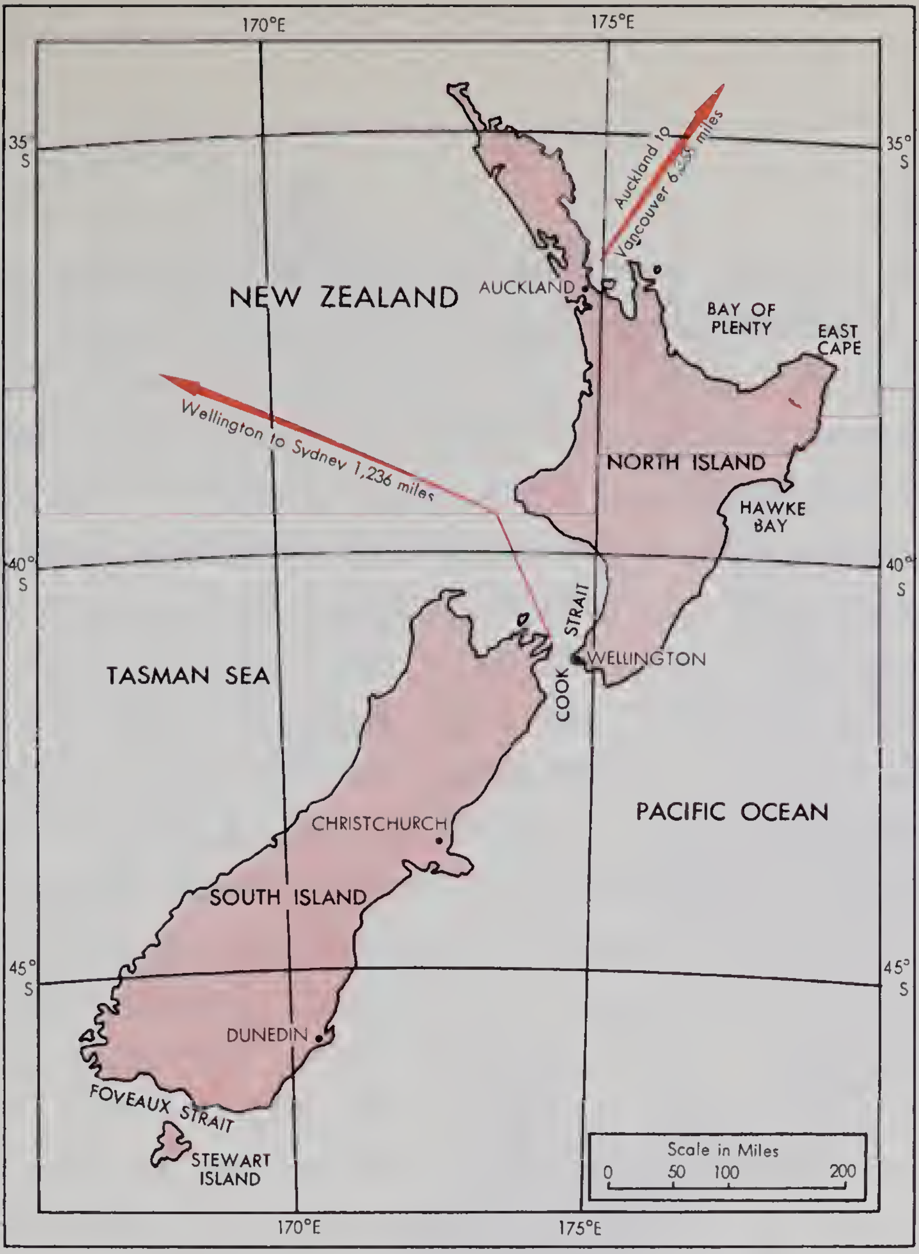
1. Australia was discovered in the (15th, 16th, 17th) century.
2. The largest Australian state is (New South Wales, Western Australia, Victoria).
3. Australia is (¾, ⅗, ⁵⁄₇) the size of Canada.
4. The main Australian mountain range is the (Australian Alps, Flinders, Darling) Range.
5. During the month of July, Australians enjoy (winter, summer, spring).
6. The Australian desert areas receive less than (15, 10, 5) inches of rain per year.
7. The main river system in Australia is the (Murray, Fraser, Eyre).
8. The most common type of forest found in Australia consists of trees that are members of the (pine, eucalyptus, mahogany) family.
9. Forests cover about (1%, 10%, 19%) of Australia's mainland.
10. Australia's agricultural economy is largely dependent upon (livestock, vegetable, wheat) products.
11. Australia produces (¼, ⅓, ½) of the world's wool.
12. Australian mines produce substantial quantities of (nickel, platinum, uranium).

13. An important steel-producing centre of Australia is (Newcastle, Sydney, Canberra).
14. Australia's important hydro-electric project is on the (Murray, Snowy, Darling) River.
15. About (50%, 99%, 75%) of Australia's people are white.
16. Today there are about (150,000, 100,000, 70,000) aborigines in Australia.
17. Australia's largest city is (Melbourne, Sydney, Perth).
18. Australia's greatest import is (wool, oil, machinery).
19. Perhaps the largest bauxite deposit in the world is located at (Cape York Peninsula, Kalgoorlie, Broken Hill).
20. Australia has more than (150, 200, 250) million sheep.

New Zealand

New Zealand is located in the Pacific Ocean approximately 2,400 miles south of the equator and 1,200 miles southeast of Australia. It lies between 34° and 48° South Latitude and between 166° and 179° East Longitude. Although most people associate New Zealand with Australia because they are both in the same section of the Southern Hemisphere, these two lands differ in several ways. Australia is a huge country occupying an entire island-continent with a generally flat surface and dry, warm climate, whereas New Zealand is a group of islands with a mountainous surface and a cooler, damper climate. The warm East Australian Current that flows from the west to surround New Zealand, provides a source of moisture for New Zealand. The westerly winds that pass over this warm ocean current before crossing New Zealand, bring reliable, year-round rainfall to the islands.

Map 1 New Zealand consists of two large islands—North Island (44,284 square miles) and South Island (58,093 square miles)—and several smaller islands. Largest of the lesser islands are Stewart Island to the south of South Island and the Chatham Islands 500 miles to the east. With a total area of 103,736 square miles, New Zealand is larger than the United Kingdom, but smaller than the British Isles. The Dominion is approximately the size of Labrador. From north to south the country stretches over 1,000 miles, but is only 280 miles across at its greatest breadth. North Island is about three-quarters as large as South Island. Cook


170°E
175°E
35° S
40° S
45° S
NEW ZEALAND
AUCKLAND
Auckland to Vancouver 6,[illegible] miles
BAY OF PLENTY
EAST CAPE
Wellington to Sydney 1,236 miles
NORTH ISLAND
HAWKE BAY
COOK STRAIT
WELLINGTON
TASMAN SEA
PACIFIC OCEAN
CHRISTCHURCH
SOUTH ISLAND
DUNEDIN
FOVEAUX STRAIT
STEWART ISLAND
Scale in Miles
0 50 100 200

Map 1. Location and Major Cities.

Strait, which separates the two islands, varies in width from 16 to 130 miles.

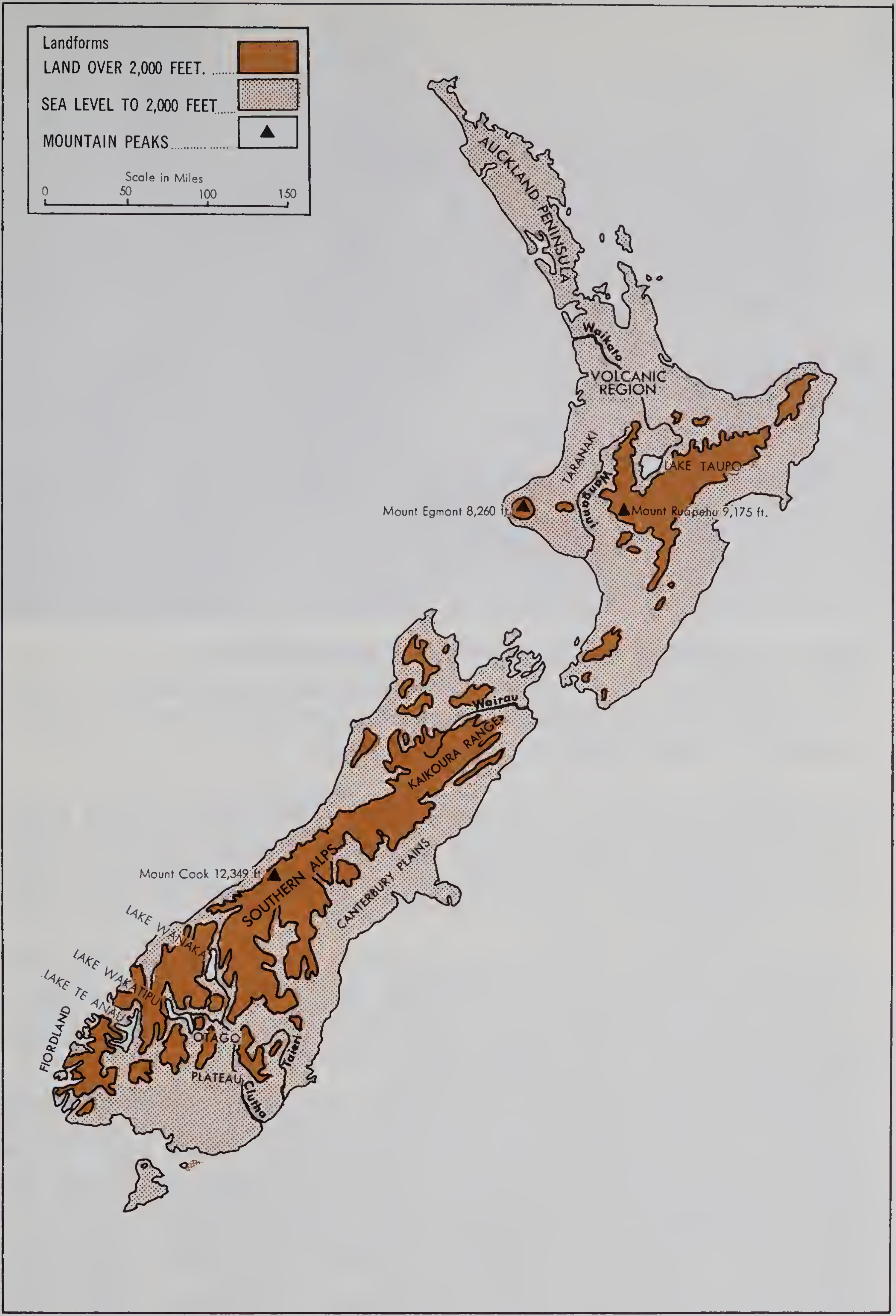
The islands were discovered in 1642 by Tasman, a Dutchman, who explored much of the west coast, but did not land. In 1769, Captain James Cook mapped the coasts and annexed the islands for Britain. In 1840, New Zealand became a British crown colony. Self-government was granted to the colony in 1852. From 1860 to 1870 a series of wars was waged between the white colonists and the native Maoris, who tried to maintain control of the central region of North Island. The Maoris were badly outclassed, and the wars greatly reduced their numbers.

Today, New Zealand is a minor world power because it (1) has a small population, (2) has little military power, (3) is not strategically located, (4) has a small area, much of which is barren mountains, (5) lacks large supplies of industrial fuels and minerals, and (6) has a comparatively small manufacturing industry.

LANDFORMS

Map 2 North Island and South Island are the tops of a range of mountains rising from the floor of the Pacific Ocean, making the surface of the country generally mountainous. South Island has the highest, most rugged mountains. The great Southern Alps, which rise to a height of 12,349 feet in Mount Cook, form a chain of mountains occupying the western half of the island and stretching from north to south. Huge glaciers flow down the eastern and western slopes of the Cook Range. The clear, cold lakes, snow-topped peaks, steep fiords, high, leaping waterfalls, and huge, impressive glaciers make the Southern Alps a land of breath-taking beauty. South Island also has the second highest range of mountains, the Kaikoura Range, which runs along the northeast coast. Rugged South Island has a smaller fraction of fertile lowland and less land suitable for farming and ranching than North Island. The lowlands generally take the form of rounded hills and slightly inclined plains. The main lowland plains of South Island are the narrow coastal plains of Westland on *Fig. 6* the west coast and the wider Canterbury Plains on the east coast.

North Island is not as rugged and mountainous as South Island. It has only one peak, Mount Ruapehu, over 9,000 feet compared with fifty-two over that height on South Island. The mountain ranges on North Island are also smaller in area and more broken up. The eastern part of the island has ranges rising over 5,000 *Fig. 5* feet. Taranaki peninsula features beautiful, wooded Mount Egmont, an isolated extinct volcano towering 8,260 feet. In the central region groups of volcanoes, including Ruapehu (9,175 ft.) rise out of a high plateau. Rolling foothills and small flat plains are *Fig. 3* found where mountains do not dominate the landscape. An amazing hot springs area occurs in the Rotorua district of North Island. In this area one can see beautiful lakes and waterfalls; pools *Fig. 12* that range from cold to boiling hot; springs which shoot forth jets of hot water or steam at intervals (geysers); holes which give off gases and vapours; and volcanoes which hurl forth mud. This area is, of course, a famous tourist attraction. The largest of the active volcanoes on North Island lie dormant most of the time, but periodically they puff forth clouds of vapour and steam. Associated with


Landforms
LAND OVER 2,000 FEET.
SEA LEVEL TO 2,000 FEET
MOUNTAIN PEAKS
Scale in Miles
0
50
100
150
AUCKLAND PENINSULA
Waikato
VOLCANIC REGION
TARANAKI
Wanganui
LAKE TAUPO
Mount Egmont 8,260 ft.
Mount Ruapehu 9,175 ft.
Wairau
KAIKOURA RANGES
CANTERBURY PLAINS
Mount Cook 12,349 ft.
SOUTHERN ALPS
LAKE WANAKA
LAKE WAKATIPU
LAKE TE ANAU
FIORDLAND
OTAGO
PLATEAU
Taieri
Clutha

Map 2. Landform Areas and Rivers.

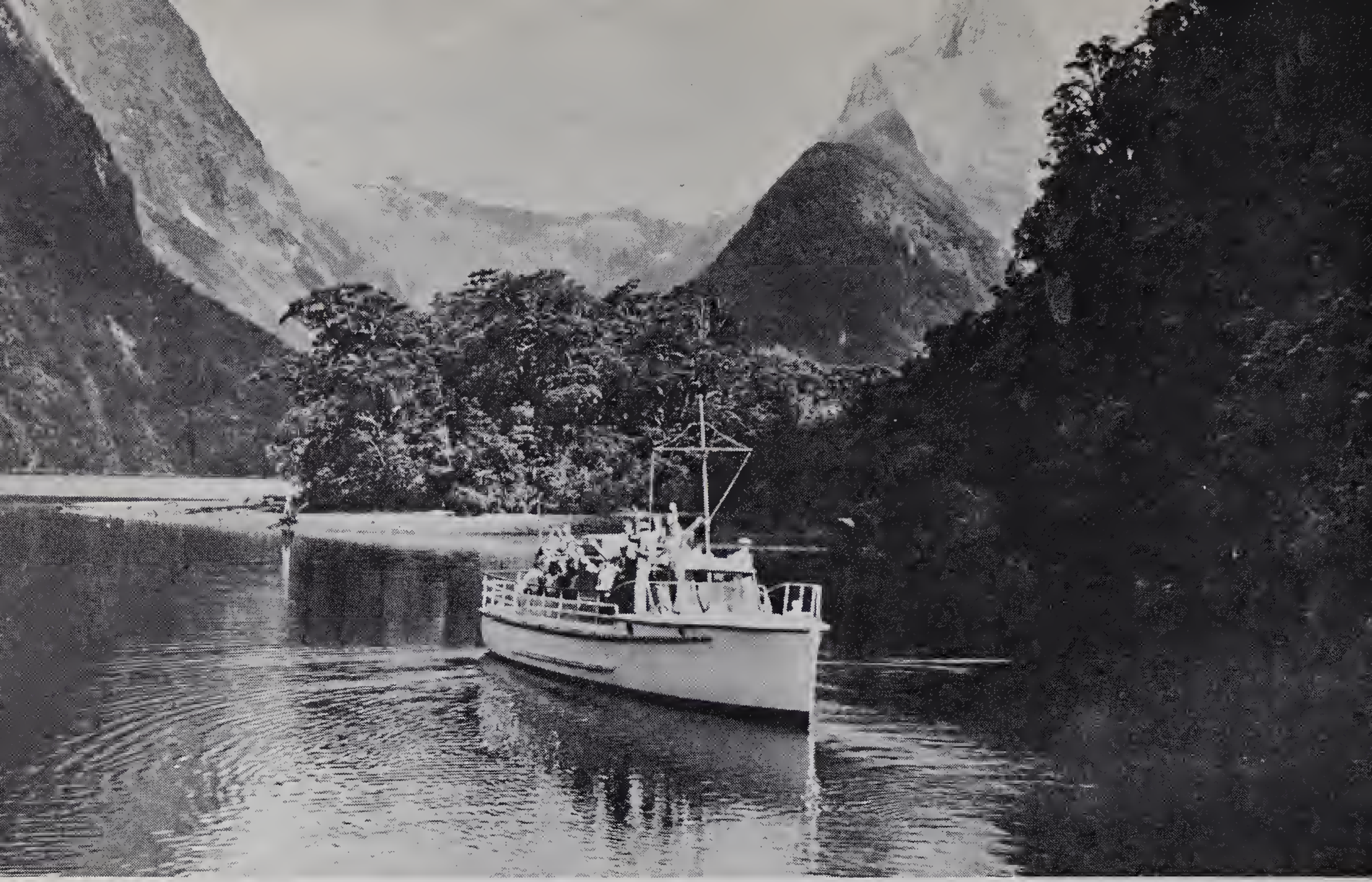


Figure 1. Milford Sound, Fiordland, South Island.
Deep channels, such as this one, stretch several miles inland, the forest-covered sides of the mountains plunging steeply into the sea. The peak on the right is the famous Mitre Peak (5560 feet).

the volcanic activity, the country often experiences violent earthquakes, especially North Island. The main lowland areas of North Island are the fertile Wellington Plains in the Southwest and much of the Auckland Peninsula.

Stewart Island is a bleak mountainous area covered with bush. Fewer than 1,000 people live on the island. The Chatham Islands are rugged islands of volcanic origin and, like Stewart Island, they have fewer than 1,000 inhabitants.

Coasts New Zealand has chiefly a broken coastline deeply indented by bays and narrow fiords, many of which serve as excellent harbours for the nation's 40 ports. Huge peninsulas and rocky headlands jut out into the sea; there are many stretches of *Fig. 1* beach. The southwest coastline of South Island has magnificent fiords, like those in Norway and British Columbia, which were gouged out by glaciers during the ice age. Some of them are thousands of feet deep and have almost vertical walls.

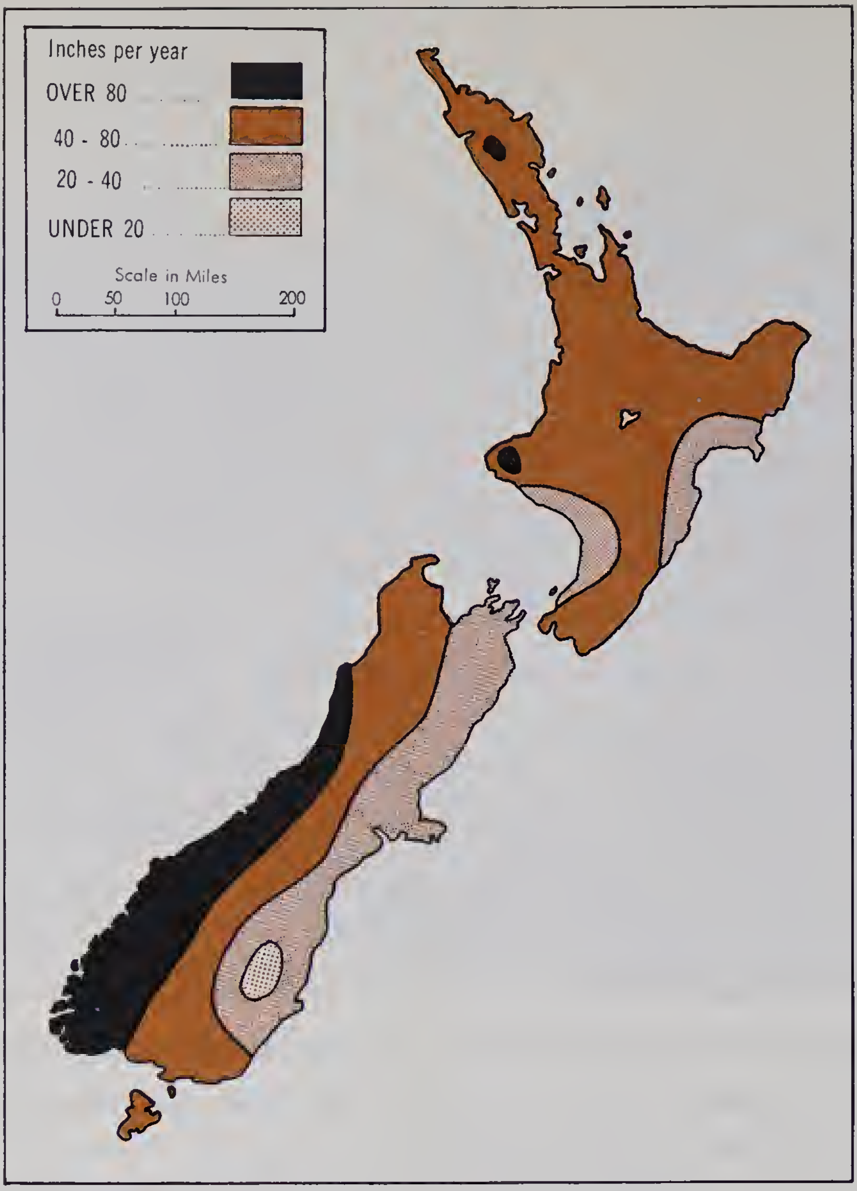
CLIMATE

The ocean waters that surround New Zealand shield the country from extremes of heat in summer and cold in winter. Being closer to the equator, North Island is always warmer than South Island. New Zealand lies between 34° and 47° 17′ South Latitude. If the country were placed on North America at the same distance north of the equator as it is south of the equator, it would stretch roughly from the middle of Lake Superior to Little Rock, Arkansas. Although the country covers almost 13° of latitude, the climate of the north does not vary from that of the south as much as the difference in latitude would suggest, because of neighbouring ocean currents and the prevailing winds. Auckland, in the northern part of North Island, has mean temperatures of 66° in January (summer) and 51° in July. Invercargill, on the south coast of South Island, has mean temperatures only 9° colder than this in summer and 10° colder than this in winter. The mildness of New Zealand's winters and the coolness of its summers, resulting in a small *range* between winter and summer temperatures, are due to the moderating influence of the sea and the winds that blow from it. *Map 1*

The relief or surface of the country also affects the temperatures. The higher levels of the mountains are, of course, colder, and the snow never disappears from the upper slopes of the Southern Alps. Even on North Island, the interior mountains and plateau have cold winters and occasional snowfalls. On the mild plains, snow is, of course, rare.

The movement of wind systems largely determines the rainfall pattern of New Zealand, creating three main rainfall areas (1) North Island, (2) Western South Island, and (3) Eastern South Island. North Island is dominated by the South-East Trade Winds in summer and by westerly winds in winter. Both move across warm ocean currents bringing rain, more of which falls in winter than in summer. Auckland in the north receives about 45 inches annually. On the south end of the island, Wellington averages 47½ inches annually. *Map 3*

Rainfall is not as uniform on South Island. Air masses move in from the west all year-round, passing over the warm East Australian



Map 3.

Annual Rainfall.

Current. Heavy rainfall results on the west coast as the moisture-laden air rises over the high Southern Alps, becomes cool, loses its ability to hold moisture, and drops it as rain or snow. Hokitika, on the west coast of South Island, gets 114 inches of rain a year, and some places in the same region receive over 200 inches a year. Spring is usually the season of maximum rainfall in the area.

The east side of the mountains of South Island is in a rainshadow and the annual rainfall is less than 20 inches in some areas. Dunedin, on the east coast of South Island, gets a moderate 37 inches annually, distributed fairly evenly through the year. The meeting of cold air masses from the south and warm, damp air masses from the warm South Pacific is the main cause of rain in much of New Zealand. Unlike Australian rainfall, that of New Zealand is fairly reliable, and droughts are rare. No section of the country could be classified as desert, and the well-distributed rainfall and generally warm lowland temperatures are very suitable for agriculture.

RIVERS AND LAKES

The plentiful rainfall and rugged surface of most of New Zealand create many swift rivers that provide excellent hydro-electric sites, but by Canadian standards these rivers are short, and none of them are large and navigable. The Waikato on North Island *Map 2* is 270 miles in length and is the longest river in the country. The largest river on South Island, the Clutha, is 210 miles long. All the rivers on the west and most of those on the east are blocked at their mouths by sandbars. Thus, although limited in value as navigable waters, the rivers are very important as sources of hydro-electricity.

During the ice age, great glaciers flowed down the slopes of South Island's high mountains. The glaciers created many hollows, which are now lakes, especially on the eastern slopes of the mountains. Thus South Island has more and larger lakes than North Island, which was not glaciated. Te Anau, which has a length of 33 miles and an area of 132 square miles, and Wakatipu, which has a length of 52 miles and an area of 112 square miles, are the chief lakes of South Island. The largest lake in New Zealand, Lake Taupo, *Fig. 3* with an area of 238 square miles, is smaller than Lake Simcoe in Ontario (271 sq. mi.). It is located in the volcanic area of central North Island. The lakes and rivers of New Zealand add greatly to the beauty of the country and are valuable tourist attractions.

NATIVE PLANTS AND FORESTS

When the white man arrived in New Zealand, he found much of the land covered with a thick, evergreen forest. Fine pine and beech trees mingled with palm trees. These luxuriant forests were overrun with climbing vines, large and small ferns, and dense undergrowth. Much valuable timber grew in these fine forests, especially the kauri pine. Only the upper slopes of the higher mountains, with no plant life, and the grass-covered Canterbury Plains of eastern South Island were not forested. The only part of New Zealand which still has large tracts of these original forests is the western slopes of the Southern Alps. Elsewhere, the European settlers, who are now the chief inhabitants, have recklessly destroyed the forests to provide timber or to clear land for farming. Natural re-forestation has been prevented by the importation of plant-eating animals, both domestic and wild. Vegetation in New Zealand now is mainly pasture grass, cultivated crops, and second-growth woodlands and only about one-fifth of the surface is now forested. One of the most serious results of the destruction of the forests in the late 19th and early 20th centuries has been the wide-spread washing away of the unprotected soil by water erosion. New Zealanders are attempting to restore the country's forests by planting new forests of native and foreign softwoods, especially in the eastern part of South Island and on the central plateau of North Island.

About 15,000,000 acres of native forest remain in New Zealand and approximately one million acres of trees not native to the islands have been planted. These figures are dwarfed by similar figures for Canada which has 288,000,000 acres of productive timberland.

Rimu, or red pine, is the principal timber tree of the New Zealand forest and the principal building material. The famous kauri pine, which has been known to attain a diameter of 22 feet, once provided much valuable timber and gum that was used to make fine quality varnish. But the kauri was so badly exploited in the past that the few remaining stands are being carefully preserved. Foreign species of planted trees, especially European and American pines, now provide as much timber as the native trees.

At Kawerau, in North Island, a new development is producing pulp, newsprint, and timber from the pines of foreign species in Kaingaroa State Forest, the largest planted forest in the world. The newsprint plant connected with the project is the fourth largest in the world. Kraft paper and fibreboard, both for export and home use, are being produced from New Zealand's maturing pine forests. The output of both agricultural and manufactured products far exceeds forest production, which is only three and one-half per cent of the country's total.

ANIMALS

The early settlers did as much damage to the native animal life

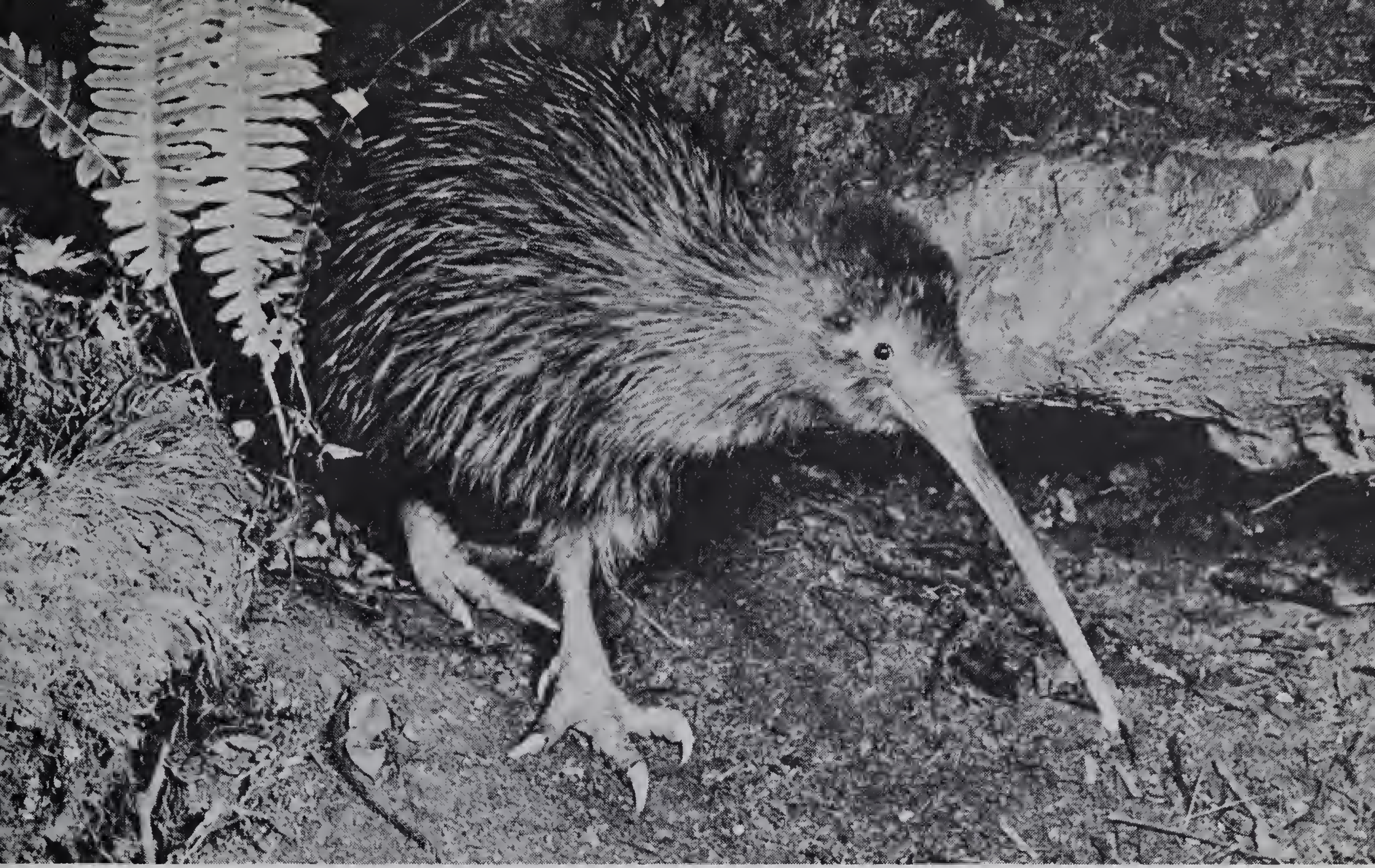


Figure 2. The Kiwi, National Emblem of New Zealand.
The kiwi is one of a number of species of birds found only in New Zealand. It is unable to fly because its wings have never fully developed and it has no tail. It has hair-like plumage and lives in a burrow in the ground, emerging at night to search for food.

of the islands as they did to the plant life. The Dominion once had large numbers of birds which were found only in New Zealand, but these native birds are rapidly becoming extinct. The destruction of the forests, extensive hunting, and the importation of animals such as wild goats, deer, wild pigs, and rabbits which further destroyed native plant life, have caused this drastic decrease in the numbers of native birds. Lacking natural enemies in New Zealand, as was also the case in Australia, the rabbits grew at an amazing rate and became a great pest. Mass killing of the rabbits has lessened the problem and their complete extinction is now in sight.

When Europeans arrived in New Zealand, they found only black rats and two species of bats representing land mammals. They found no land snakes, but many strange lizards, including one, the tuatara, with a partly-developed third eye in the centre of its forehead. There were over thirty species of birds, including the bellbird with a bell-like note, a hawklike parrot that can kill sheep, and several birds which were incapable of flight. Included in the latter group is the kiwi, which is the national emblem of New Zealand. Many foreign birds, such as sparrows, starlings, and thrushes, have been introduced and now are numerous in the country. *Fig. 2*

In the fresh waters are found eels and many fresh water fish. The oceans around New Zealand contain sharks, swordfish, seals, dolphins, porpoises, whales, and giant squids, sometimes with arms twenty feet long.

WORK UNIT 20

The Language of Geography Add to your reference list definitions of the following terms: rainshadow, geysers, headlands, kauri pine, earthquakes, volcanic origin, commercial forests, rimu.

Problems and Projects

1. Draw a map of your province and one of New Zealand on the same scale, using transparent paper. Superimpose the smaller on the larger and compare their shape and dimensions.
2. Prepare oral reports on (a) geysers, (b) volcanoes, and (c) earthquakes.
3. Classify the New Zealand place names used in the text as either European or Maori in origin.
4. Obtain additional information about (a) kauri pine, (b) kiwi, (c) tuatara, (d) dolphins, (e) porpoises, and (f) giant squids.
5. What features make (a) the Southern Alps and (b) the hot springs region of North Island attractive to tourists?
6. Why are the temperatures and rainfall of New Zealand similar to those of the British Isles?
7. Why did the careless destruction of native trees in New Zealand cause more soil erosion there than it did in the British Isles?

Maps

1. On an outline map of New Zealand, mark (a) main islands, (b) coastal waters, (c) mountain ranges and plains, and (d) largest rivers and lakes.
2. On another map, make a climate map to include (a) most constant winds, (b) rainfall areas, and (c) temperatures.

Figure 3. Lake Taupo, North Island.
This beautiful lake is popular as a vacation spot and is a valuable reservoir of water to be used in the production of hydro-electric power.

AGRICULTURE

New Zealand is primarily a dairying-pastoral country. Wool, dairy products, and meat make up over 90 per cent of New Zealand's export trade and farm products account for over half of total production. Several European countries and the United States buy most of New Zealand's exports. The surface, soils, and climate of New Zealand make it one of the world's best stock-raising nations: the country usually has about 47 million sheep and 6 million cattle, many of which are milk cows. Thus New Zealand produces large quantities of wool, mutton, lamb, beef, veal, butter, cheese, and milk. Despite the commanding position that farm products hold in the economic life of the country, farmers make up only 15 per cent of the total labour force.

The total area of New Zealand is approximately 66 million acres, of which one-third is useless for farming because of its mountainous

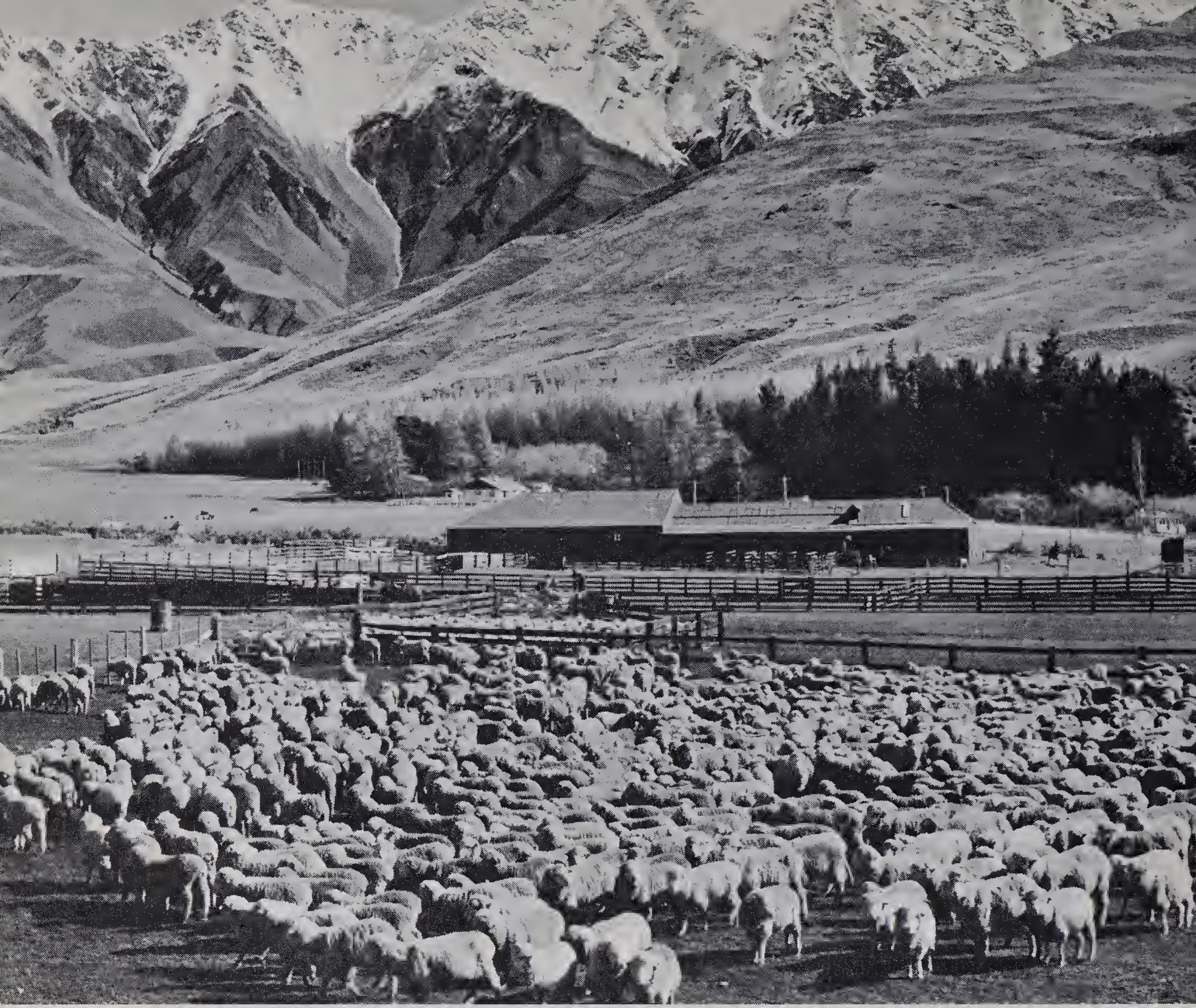


Figure 4. A Sheep Station on South Island.
This is a flock of Merino sheep at a station on the Canterbury Plain. The peaks of the Ben Ohau Range tower above the well laid-out yards and the modern homestead. Although most New Zealand sheep are raised for meat, the Merino breed is raised for its excellent wool. This area, which is in the dry rainshadow of the Southern Alps, provides good grazing land for sheep.

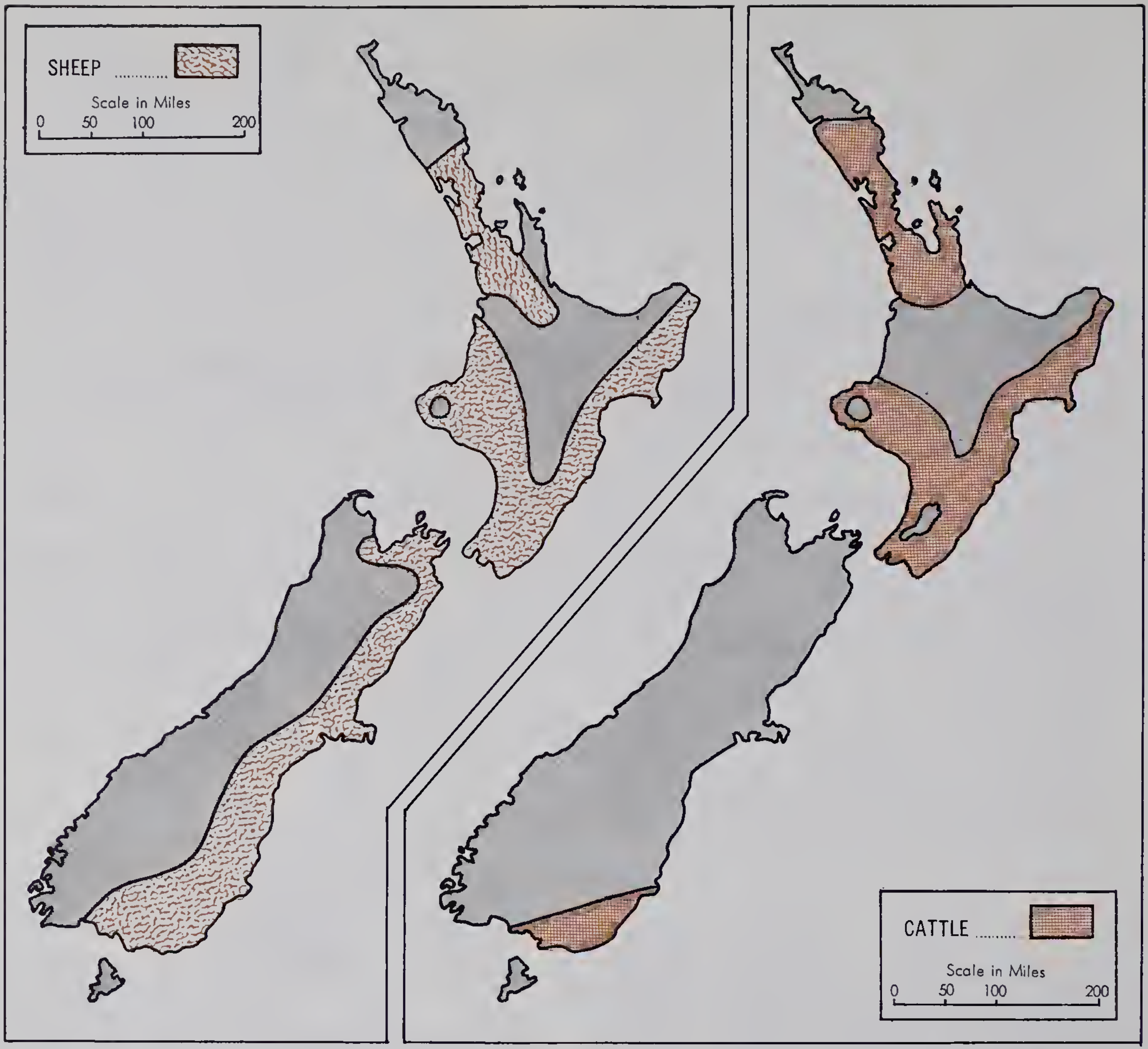
nature. Of the 43 million acres which are classified as farmland, 40 per cent is sown pasture and 30 per cent is native grass. With 70 per cent of the farmland devoted to grass, it is not surprising that the main agricultural activities are associated with the raising of livestock, especially sheep and cattle.

More than half of the farms are over 100 acres in size and more than one-tenth are over 640 acres. However, New Zealand cattle ranches and sheep runs are smaller than those of Australia and a greater emphasis is put upon meat production than upon wool production. Only on the high, drier pasture lands on the east side of the mountains does the Merino, a sheep raised primarily for fine wool, outnumber the breeds raised chiefly for meat. This emphasis upon meat production is possible because the reliable and generally adequate rainfall of New Zealand provides much richer land than the unreliable, scanty rainfall in large areas of Australia.

Sheep: Most of the sheep are raised in the cooler and drier parts of the islands. The major sheep-raising areas are east of the mountains in both North Island and South Island, but the drier parts of the Wellington Plain and an area south of Auckland also support a large sheep population. Although there are actually more sheep raised on North Island than on South Island, sheep are more important to the economy of South Island than they are to the economy of North Island, where cities are more numerous and cattle provide a greater source of income. The total sheep flock of New Zealand rates fifth in numbers and second in wool production for the world. The average flock of sheep is about one thousand, but flocks many times this size are common. Romneys, an English breed, are the most popular. *Map 4*

Cattle: Although sheep-raising uses more land in New Zealand than cattle-raising, the beef and dairy products of the cattle industry *Map 5*

Figure 5. The Taranaki District of North Island.
This region of lush pasture land lies on the west coast, dominated by the impressive peak of Mount Egmont. Reliable, year-round rainfall and warm temperatures create ideal conditions for intensive dairy farming.



Map 4. Sheep-Raising Areas. **Map. 5. Cattle-Raising Areas.**

provide more money to New Zealanders than do the wool, mutton, lamb, and other products obtained from sheep.

Fig. 5 North Island has several natural advantages which make it the main cattle area of the nation. Rich pastures and excellent fodder crops thrive in the mild, damp climate of the western and northern sections of the island. Although beef production is substantial, the main emphasis is on dairying and the production of butter and cheese.

Several conditions make it possible for the great variety of New Zealand's dairy products to sell profitably in European and North American markets thousands of miles away, despite competition from European and North American suppliers. The short, mild winters of North Island reduce the expense of winter feed and shelter because grass grows almost continuously throughout the year and winter housing of stock is unnecessary. The reversal of seasons in the Southern Hemisphere allows New Zealand's peak producing period to coincide with a period of low production in northern lands. New Zealand butter and cheese, therefore, usually sell well in Europe and North America during the northern winter. Expert processing and shipping methods maintain New Zealand's agricultural products at a high level of quality — another factor which increases the demand for the Dominion's farm products.

Rural New Zealand, with its rich green pastures, English-type houses, and European breeds of sheep and cattle, resembles rural England. Most New Zealand farmers own their own farms, which are well equipped and scientifically operated. In addition, the farmers often cooperatively own the factories which manufacture their own milk into butter and cheese.

Figure 6. The Canterbury Plain.
This area of flat, fertile land stretches for 200 miles along the east coast of South Island, providing excellent pasture land for sheep, and good, easily cultivated, arable land. During a century of settlement, a pattern of trees and hedges has developed similar to the English countryside from which the first settlers came.

Crops Crops are comparatively unimportant because less than four per cent of New Zealand is cultivated. Canada has approximately the same percentage of cultivated land, but because of its greater area, it has thirty times more crop land than New Zealand. Grass is the most important crop, being grown as food for the stock-raising industry and for high-quality grass seed, which is exported in large amounts.

Fig. 6 The main grain crop is wheat, three-quarters of which is grown on the Canterbury Plains and most of the rest in the north part of Otago district. Usually, production meets only about one-third of the country's needs. New Zealand has less than one per cent as much land in wheat as does Canada. Sufficient amounts of oats, barley, potatoes, other vegetables, and many fruits are grown. Large numbers of apples and pears are exported. On South Island the main fruit-growing regions are central Otago and the Nelson Valley between the Kaikoura range and the Southern Alps in Nelson district. The latter region is famous for its apple production. In central Otago fruits are grown in irrigated orchards. On North Island the main fruit-growing areas are the Auckland Peninsula, Hawke's Bay, and the Hutt Valley near Wellington. North Island produces citrus fruits and grapes, especially on the subtropical Auckland Peninsula. Some tobacco is grown in the northwestern part of South Island.

FISHERIES

Less than one per cent of total production is accounted for by fisheries. Rich fishing grounds are available, but are little used because there is only a small home market and little chance for export. Oysters are plentiful and of good quality, especially in Foveaux Strait; the snapper is the principal species in the fish catch. There is considerable big game fishing done for swordfish, sharks, marlins, and others off the east coast of North Island.

MINERALS AND POWER

Although the mountains of New Zealand are believed to contain many valuable minerals, as yet most of them are undiscovered and undeveloped; so mining is comparatively unimportant in New Zealand. The main minerals produced are coal and gold. The latter, which was once produced in much larger quantities, is found near Greymouth and Hokitika on South Island, and in combination with silver at Hauraki in the Auckland district. New Zealand's annual coal production of 2½ million tons just supplies the country's own needs. Much of it comes from Waikato on North Island and around Westport and Greymouth on South Island. Other minerals found in commercial quantities, but not produced in large amounts, are silver, iron, limestone, tungsten, and manganese. The value of mineral production is approximately equal to that of forest products. *p. 288*

New Zealand is short of all types of power except hydro-electricity. The country has many clean rivers which flow steadily and swiftly from the mountains. These provide many excellent sites for hydro installations, which are being rapidly developed. The two biggest installations are on the Waikato River on North Island and Clutha River on South Island. *Map 2* Coal production is adequate, but most of it is sub-bituminous or lignite (brown coal). No large oil fields have yet been found and there are only a few small oil deposits. Despite these shortages, sufficient electricity is available to provide power for most of the country's needs.

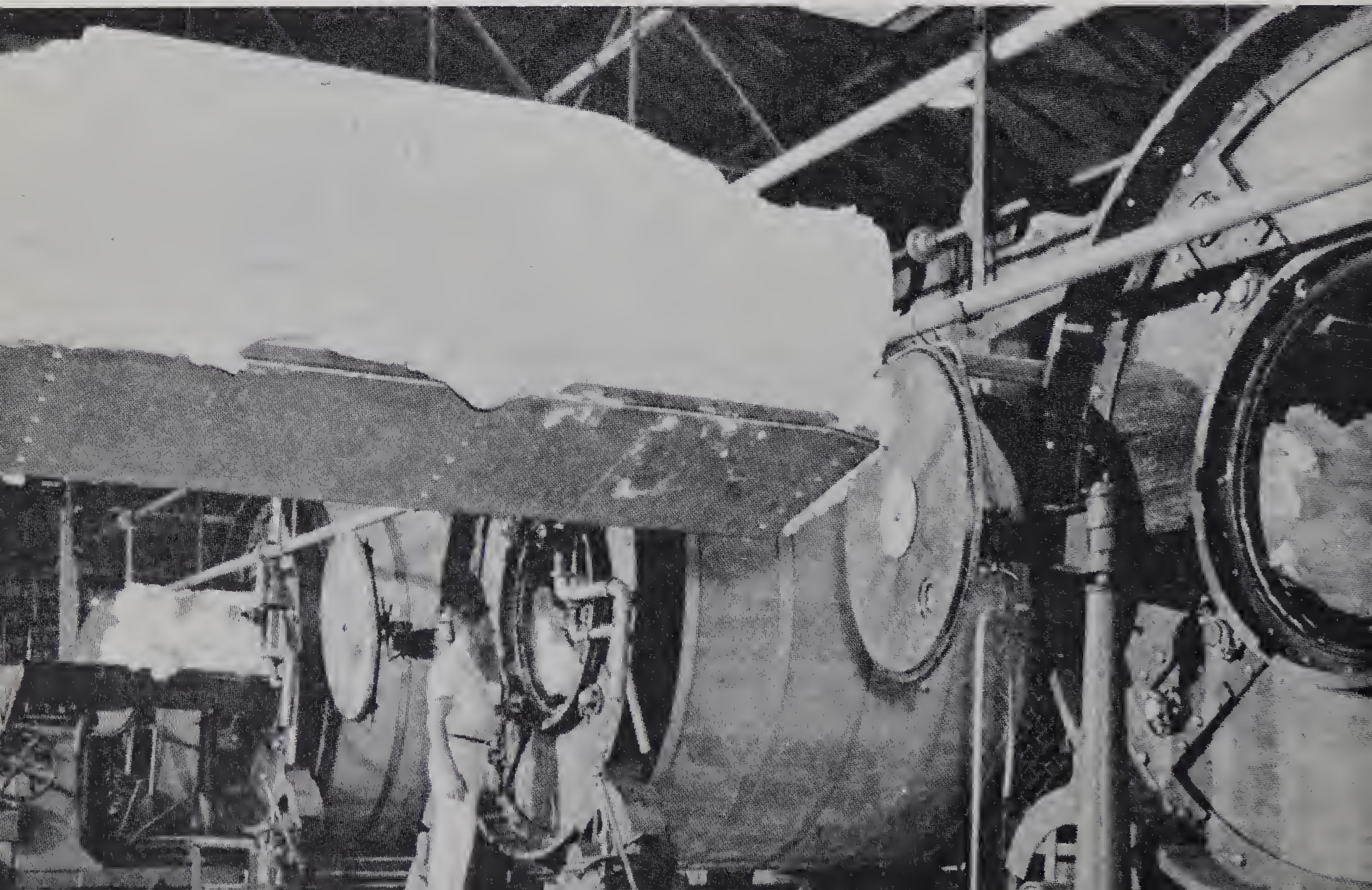
MANUFACTURING

Although agriculture is the basis of economic prosperity in New Zealand, there are more workers in factories (about 220,000 employees) than on farms (about 140,000 farmers). However, the factories of that country would seem small by Canadian standards. About two-thirds of all registered factories employ ten or fewer workers, and only thirty have a staff of over five hundred.

New Zealand's small population has hindered the development of large heavy industries. It is not economically sound to build large factories filled with expensive machinery unless many units can be produced. For example, a fraction of the cost of the plant and equipment must be added to the selling price of each car that a factory produces. The more cars that are produced, the lower the price at which the manufacturer can sell his cars. This hard economic fact explains why the same type of car costs more in Canada than in the United States, and why New Zealand buys cars and other large manufactured items from foreign countries rather than making them herself. A general lack of industrial minerals and raw materials also hampers the development of heavy industry. However, there are many smaller factories making goods for the home market. Some of the more important ones are light foundries; engineering works that build locomotives, small ships, and coach bodies; and plants that assemble imported motor vehicles and machines. The last fifteen years have seen a rapid development of the light engineering industry, so that New Zealand now produces a large range of electrical goods for domestic use. The most spectacular recent developments have been in pulp and paper and other forest industries, using timber from large forests in North Island that were planted with fast-growing foreign species.

The largest group of industries is the processing, packing, and *Fig. 7* shipping of livestock products. There are a great number of creameries, cheese factories, milk-drying or condensing plants; meat-packing, canning, and freezing plants; and factories processing

Figure 7. A Dairy Factory.
A ton of butter is being removed from this large churn.



hides, skins, and pelts. Other important industries are sawmilling and the manufacture of forest products; the making of woollens, shoes, and clothing; the production of fertilizers; printing and publishing; flour milling; the brewing of beer; the baking of biscuits; and the generating of electric power. New sources of hydro-electric power which still can be developed on South Island, together with thermal electricity which is being developed on North Island where few new hydro power sites are available, will probably lead to the building of many more small industries. They will still, however, probably produce mainly for the home market.

THE PEOPLE

New Zealand has only 2½ million inhabitants, giving it an average density of 24 persons per square mile. This figure is high compared with Canada (5) and Australia (3) with their vast areas of uninhabited wasteland, but very low compared with the United Kingdom (575), which has much smaller areas of uninhabited mountain land than New Zealand. *Map 6*

Occupations As in Canada and other countries which enjoy a high standard of living, a large fraction of the labour force of New Zealand is employed in administration and servicing industries. Of every ten workers, two are engaged in farming, forestry, or some other primary industry, three are involved in construction or manufacturing of some type, and the other five provide such services as transportation, retailing, banking, entertainment, and government.

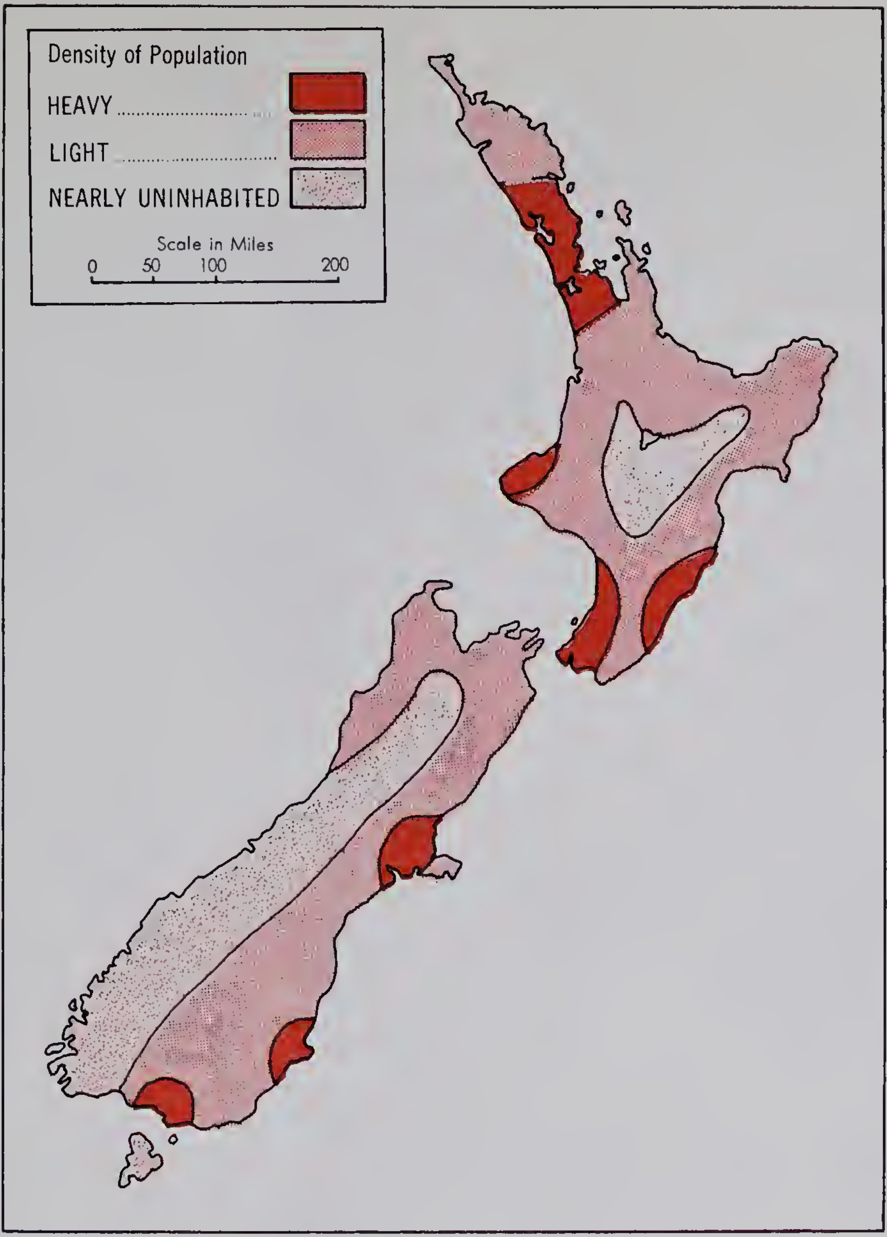
Racial Background Two main types of people live in New Zealand — (1) the Maoris and (2) the European settlers. Because of a very restricted immigration policy, similar to that of Australia, which admits few Asiatic or Negro people to New Zealand, the settlers are almost all white. Of these, about 94 per cent are descendants of people from the British Isles. The natives who inhabited the land when the settlers arrived are called Maoris. They are a Polynesian people related to the natives of Samoa, Tahiti, Hawaii, and other western Pacific islands. These brown-skinned natives had arrived by canoes many years before the white man and had developed a very advanced civilization compared with that of the Australian aborigines.

They were an active, ambitious, warlike race when the settlers arrived, but the white man drastically cut down their numbers and disrupted their traditional hard-working way of life. The settlers took their best lands, exposed them to diseases from other lands, and killed many of them in battle.

Fortunately, conditions vastly improved when the native wars ended in 1870. An attempt was made to restore the pride and morale of the Maoris. They were encouraged and helped to adopt new habits, but at the same time to retain much of their old culture and be proud of it. The attempt proved so successful that the number of natives not only stopped declining but began to increase at a faster rate than the white population. There are now over 170,000 Maoris in New Zealand, or about seven per cent of the total population. Only about half of them are pure-blooded, a mixture of white and Maori being quite common. Four of the eighty seats in the New Zealand House of Representatives are allotted to the Maoris. Many of the Maoris have risen to cabinet level or become eminent in the professions. Ninety-seven per cent of the Maoris live on North Island where they farm and raise livestock on a cooperative basis. Some are beginning to move to the cities to work because their land holdings are not adequate to support all of them at as high a level as the average white settler. New Zealand has done a far better job in handling the Maoris than Australia, the Republic of South Africa, and Canada have done in the treatment and development of their native peoples.

Religion, and Educational and Health Standards New Zealand has an excellent system of education and a progressive medical health programme which covers the Maoris as well as Whites. The majority of New Zealanders are Protestants; about 14 per cent are Roman Catholics; some Maoris still cling to native religions; and there are a few thousand Jews. English is the main language. The Maoris speak it in addition to their own language.

Distribution Although New Zealand is basically an agricultural country, over 40 per cent of the people live in the five largest cities



Map 6. Distribution of Population.

—Auckland, Christchurch, Wellington, Dunedin, and Hutt. Many more live in smaller cities and towns, so that less than 40 per cent of the population is classed as rural, which is unusually low except in modern, industrial nations. Only in South Island, where 30 per cent of the people live, is the population mainly rural. Most of the cities are located in the coastal plains or on the sea coast. Because of the small population, none of the cities is very large: Auckland, the largest, is less than one-quarter the size of Toronto, Canada's second largest city.

Cities *Wellington,* which has been the nation's capital since 1865, has a population of about 144,000, but the metropolitan area, which includes the city of Hutt, has over 250,000 people. Central location is the reason for Wellington's growth and its choice as capital. Its location, plus an excellent harbour, have made it the main port for inter-island and coastal shipping and an important ocean shipping centre. The city has a large number of industries. *Map 1*

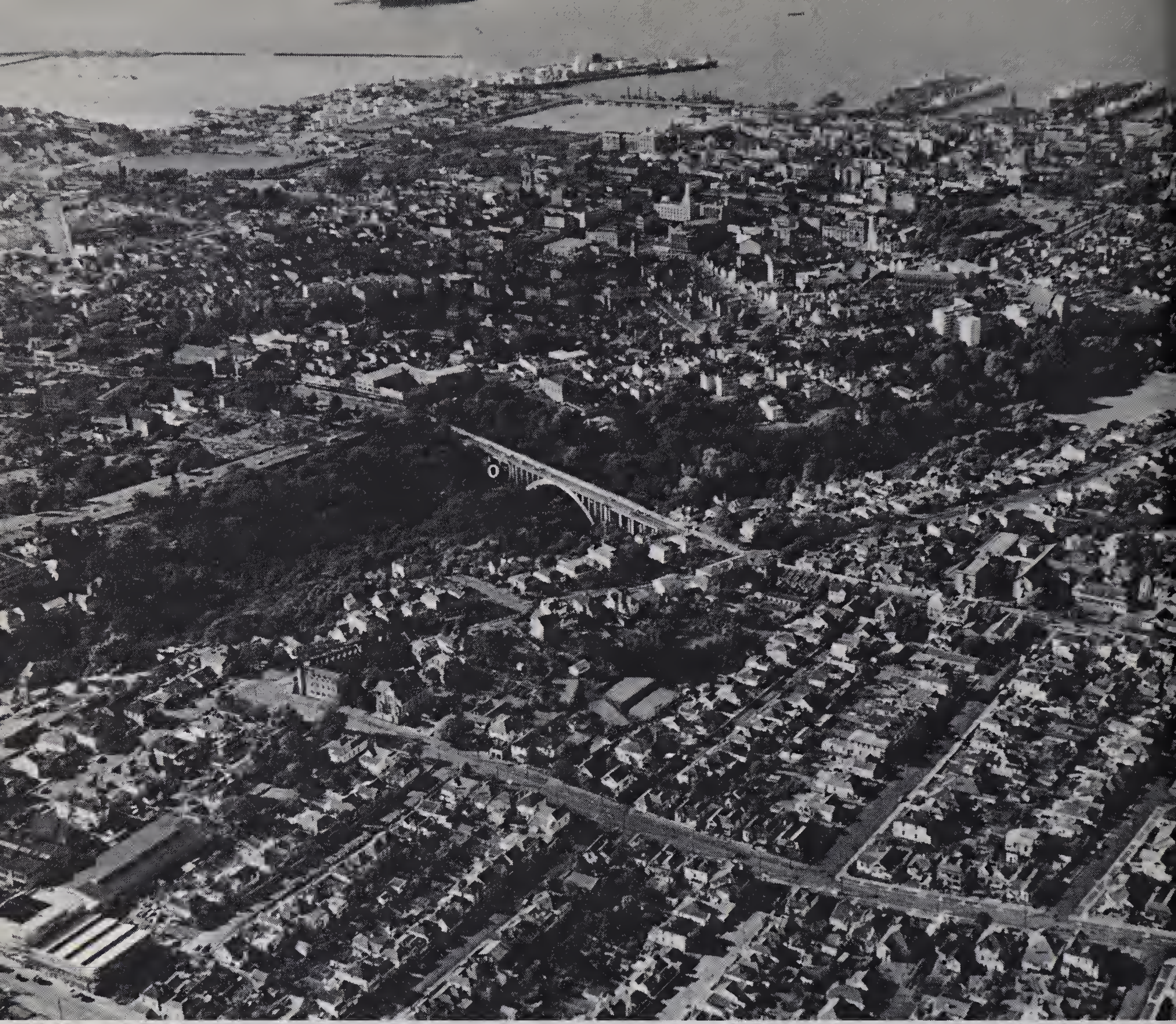


Figure 8. Auckland.
Auckland is New Zealand's largest city. It enjoys a magnificent situation on an isthmus between two good harbours. Many of its suburbs overlook the sea and the population makes full use of the many excellent beaches. Auckland is a bustling, important, modern city.

Fig. 8 *Auckland,* with a population of about 140,000, is the largest city in New Zealand, and Greater Auckland contains over 400,000 people. Originally the capital of New Zealand, its non-central location on the northern peninsula of North Island caused it to lose that status in 1865. However, its location does make it the most important air and ocean port, since it is closer to Pacific trade routes. Situated on an isthmus only six miles wide, it has access to two excellent harbours: Waitemata on the east and Manukau on the

west. Its hinterland is a large rich dairy area. Therefore, the processing of dairy products and meat canning are important industries in Auckland.

Christchurch, with a population of almost 150,000 and a metropolitan population of 220,000, is the largest city on South Island and the third largest in the country. It serves the Canterbury Plains, which are famous for lamb and mutton and produce much of the nation's wheat and grain. Since it is seven miles from the sea, it is served by the port of Lyttelton, which is the chief port for the export of meat. Important industrial products are canned meat, leather, and fertilizer. The religious name is due to the fact that the city was founded by the Anglican Canterbury Association. The streets are named after bishoprics of the Church of England.

Dunedin has about 73,000 people in the city and 105,000 in the whole metropolitan area. It is a clothing and textile centre at the head of Otago Harbour, fifteen miles from the ocean. Through Port Chalmers, nearer the mouth of the harbour, the city exports wool and gold.

In addition to the four larger cities mentioned above, New Zealand has several urban centres with over 20,000 inhabitants. Some of the larger ones are *Hutt, Palmerston North, Hamilton, Wanganui, New Plymouth, Napier, Gisborne,* and *Hastings* on North Island and *Invercargill, Timaru,* and *Nelson* on South Island.

TRANSPORTATION AND COMMUNICATIONS

The mountainous nature of New Zealand with its many rivers makes railway and road building difficult and costly because of the many tunnels and bridges that must be built. However, all the larger communities are connected by railways and roads. As in Australia, almost all the railroads are government owned. Because of the smaller area and population of New Zealand, the country has only about one-tenth as much railway and highway mileage as Canada. The sand bars, rapids, waterfalls, and fast-moving water of the rivers makes them almost useless for transportation. Government-owned airlines provide the country with service between major cities and several world airlines have flights landing at Auckland.

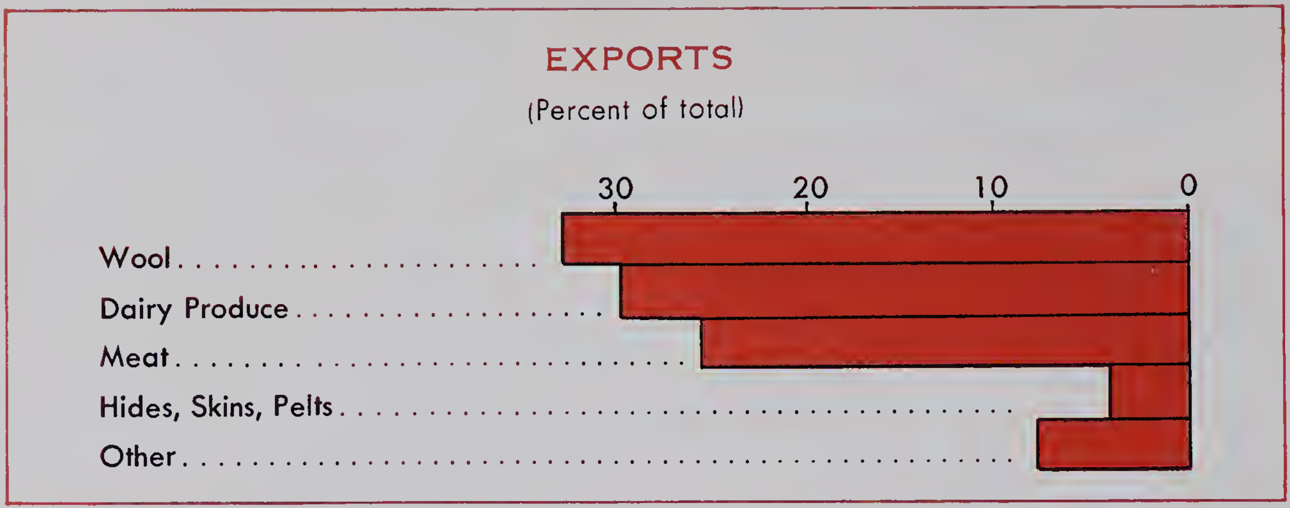


Figure 9. Exports.

Coastal shipping plays an important role in connecting the towns and cities. Although the country's broken coastline provides many excellent harbours, most of the cargo passes through the main *Map 1* ports at Auckland, Wellington, Lyttelton (the port of Christchurch), and Dunedin. Mail, telegraph, telephone, radio, and cable services are well developed and widely used. The nation is well served by local newspapers and radio stations. New Zealand had no television until 1962.

TRADE

On a per capita basis (i.e. total value of the goods traded, divided by the population) New Zealand is one of the world's *Fig. 9* top trading nations. This trade allows New Zealanders to have a high standard of living, but puts her economy in a bad condition if world prices are poor, especially for agricultural products in the United Kingdom, Europe, North America, and Australia. Dairy products, meat, and wool usually make up about 90 per cent of the total exports. In many years, New Zealand is the world's largest exporter of dairy products and meat, and usually she trails only Australia in the export of wool. New Zealand's best customer, by far, is the United Kingdom which buys two-thirds of the country's total exports. Other good customers are the United States, France, West Germany, Australia, Japan, Italy, and Canada.

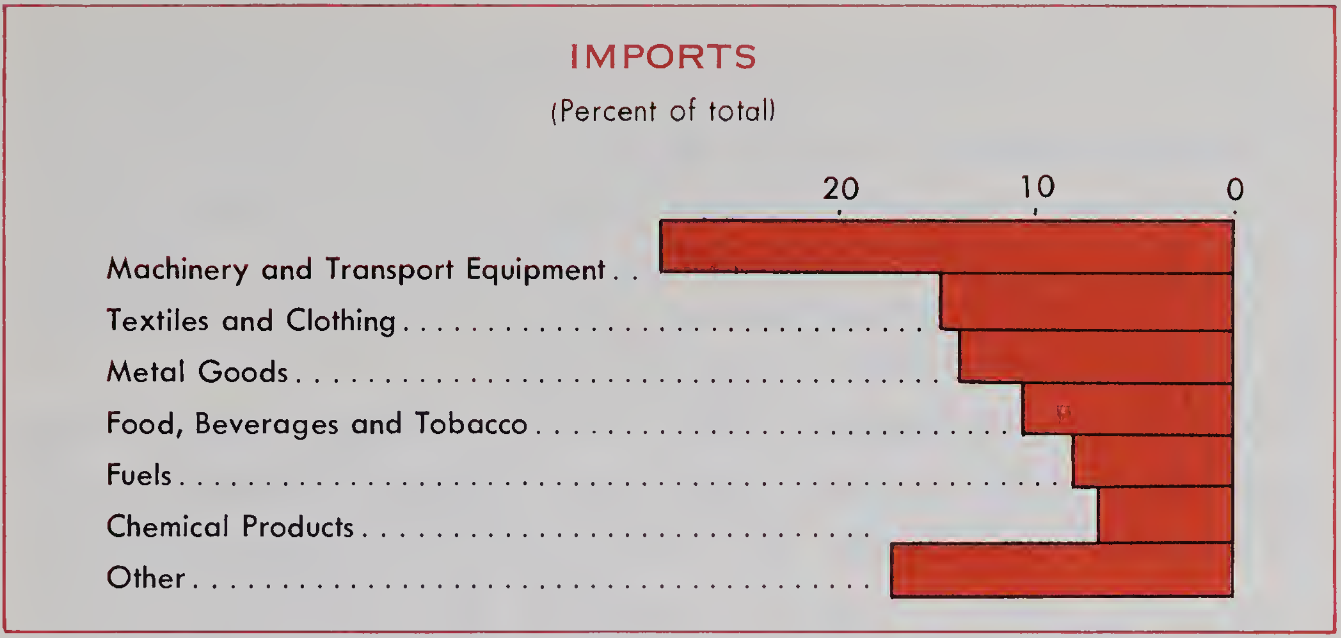


Figure 10. Imports.
Imports consist of a wide range of manufactured goods.

New Zealand purchases most of the items she needs from the nations that buy her products. Britain supplies over half of New Zealand's imports, followed by Australia, the United States, Federal German Republic, and Canada. More than four-fifths of her imports are wholly or partly manufactured goods. This is because, as mentioned earlier, she lacks a large manufacturing industry of her own, due to (1) a shortage of fuel, (2) a small domestic population to buy manufactured goods, (3) great distance of the country from possible markets, and (4) the efficiency of large-scale foreign producers, especially British manufacturers. Many of the partly manufactured goods which are imported are further processed in New Zealand into finished manufactured items. Drapery and cotton and woollen piece goods are excellent examples of this procedure. Other important manufactured imports are machinery, tools, engines, motor vehicles, metals, paper, chemicals, drugs, and petroleum products. Sugar, tea, liquors, tobacco, and wheat are all imported in large quantities, either because New Zealand's climate will not allow the production of such products or because the nation's farm lands are being used to provide more profitable products. Nearly two-fifths of the goods available in New Zealand are imported from other countries. *Fig. 10*

PROBLEMS

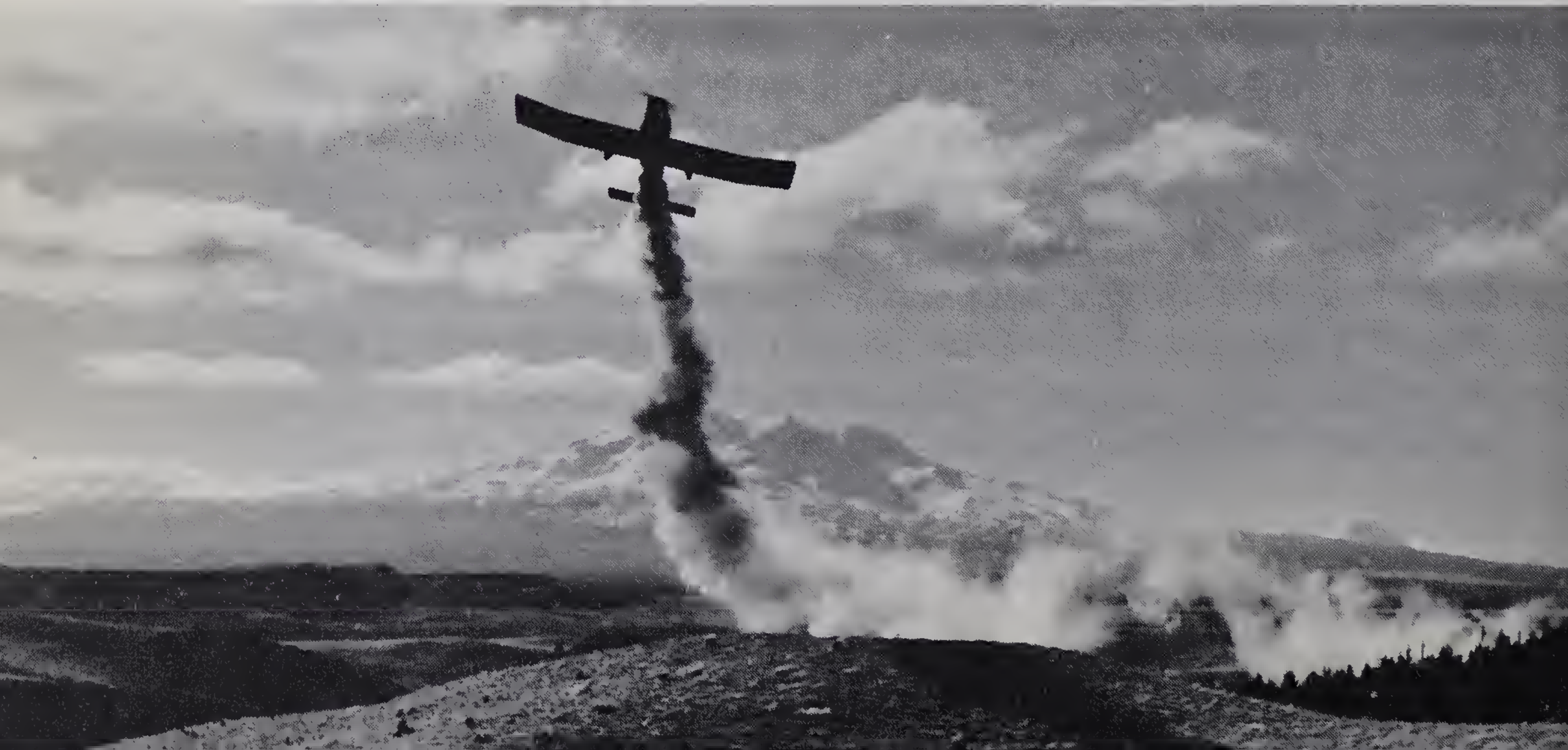
Because New Zealand is rather isolated in the South Pacific, distance from other countries has caused a number of problems. The most troublesome has been the shipment of New Zealand's exports to distant markets without allowing shipping costs to put the price of New Zealand products too high above those of competitors closer to the markets. The distance from major manufacturing nations also adds to the cost of imported industrial goods. *Map 1*

Because the population is small on these islands, overcrowded Asian nations such as China, Japan, and Indonesia threaten expansion into the South Pacific. The long distance from natural allies increases this threat. A small population also means that manufactured goods tend to cost more because they cannot be produced in large quantities.

Manufacturing is further hindered by the shortage of coal and petroleum which are needed in large amounts for cheap manufacturing. This shortage will probably restrict New Zealand to light manufacturing industries.

Map 2 Much of the surface of the islands is mountainous, so that agricultural land is limited and scattered. The cost of building railway lines and roads to join the main urban centres and agricultural areas has been expensive because roads and railway lines have had to penetrate the mountains.

Figure 11. Aerial Topdressing on North Island.
The aircraft skims low over vast grasslands, spreading fertilizer to improve pastureland which is too rugged for cultivation.



CONCLUSION

The Dominion of New Zealand became a member of the British Commonwealth in 1907 and is now a completely independent nation within the Commonwealth of Nations. Like Australians and Canadians, New Zealanders accept the monarch of the United Kingdom as their king or queen. Government organization is very similar to that of the United Kingdom in which there are only two levels of government—national and municipal. Because it is small, the country is not divided into separate provincial governments. An upper house, similar to our Senate, was abolished in 1951, leaving a single chamber system.

In addition to the islands that are considered part of New Zealand proper, such as Stewart Island and the Chatham Islands, the nation rules several outlying islands. Some of the more important in this group are the Auckland Islands, Campbell Island, the Antipodes Islands, Kermadec Islands, and Cook Islands. The Ross Dependency, a large region of the Antarctic continent, is officially attached to New Zealand. The Dominion also administers two areas as United Nations trust territories. They are (1) Western Samoa and (2) the island of Nauru, which New Zealand controls jointly with Australia and the United Kingdom.

New Zealand is a member of the United Nations and is allied for defence with the members of the Southeast Asia Treaty Organization (S.E.A.T.O.).

As a respected member of the Commonwealth with high levels of education, health, democratic skill, and living standards, New Zealand is an important nation. But its limited area, small population, lack of major minerals and fuels, and isolated location will probably always keep it among the lesser powers of the world.

WORK UNIT 21

The Language of Geography Add to your reference list definitions of the following terms: Romneys, game fishing, sub-bituminous, freezing plant, per capita, processing industries, aerial topdressing, isthmus.

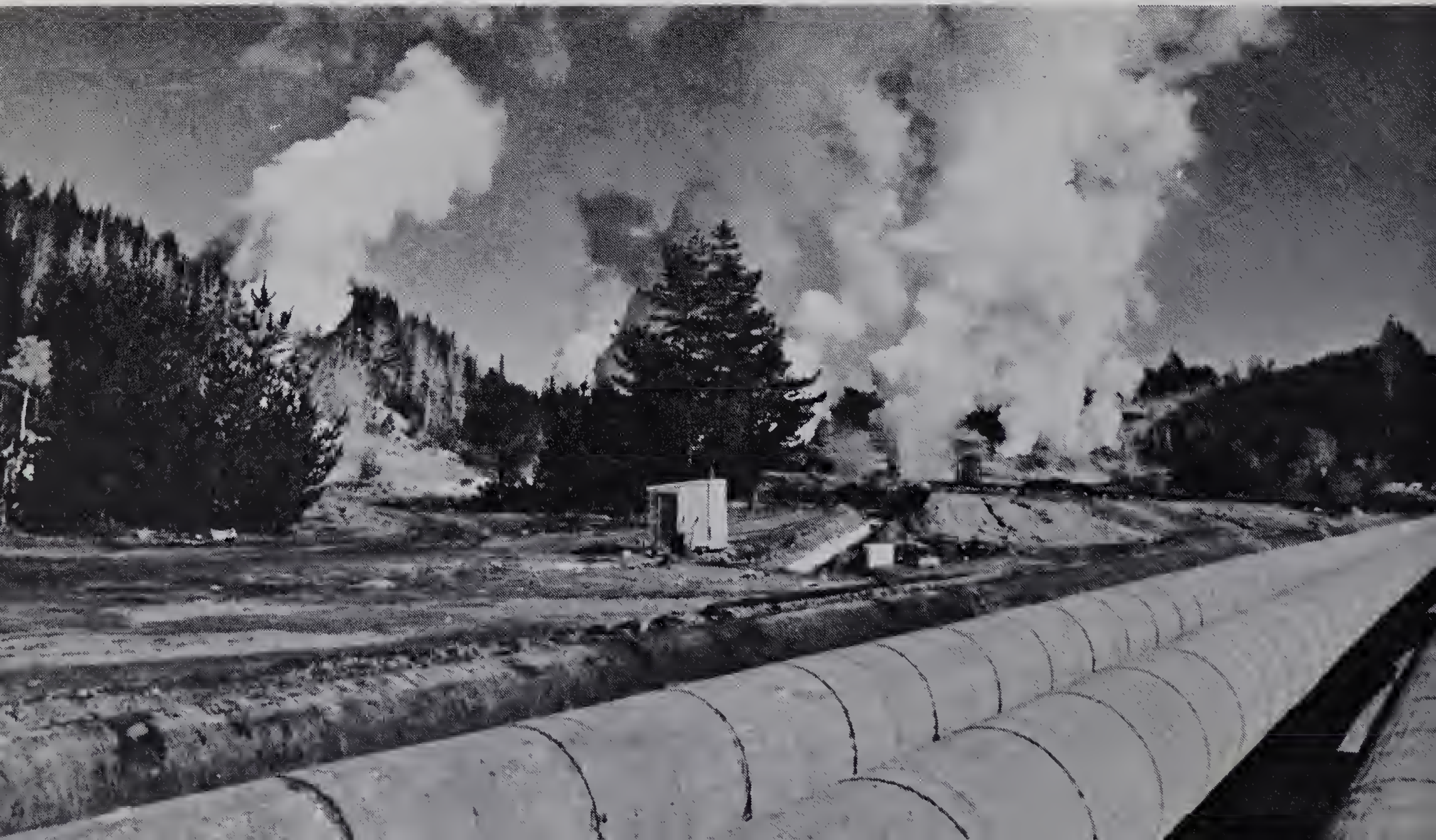
Problems and Projects

1. Draw two bar graphs to compare the number of (1) sheep and (2) cattle kept in New Zealand with the same figures for (a) United Kingdom, (b) Australia, and (c) Canada.
2. What part of Canada has the same problems in building roads and railways as does New Zealand?
3. Compare the treatment of the Maoris by the European settlers with the treatment of North American Indians by Canadians.
4. Why has the raising of livestock become the major industry of New Zealand?
5. How important in New Zealand are forestry, fisheries, and mining compared with agriculture?
6. What are some of the major dairying areas of the world and what characteristics do they have in common with North Island?
7. What functions do the four major cities of New Zealand have in common? Name two cities described in each of (a) the British Isles, (b) Africa, and (c) Australia that have similar functions.

Maps

1. On separate outline maps of New Zealand indicate (a) main sheep areas, (b) main cattle areas, (c) cities and population density.

Figure 12. Tapping Steam from North Island Hot Springs. *Volcanic activity near Lake Taupo creates hot water and steam which are discharged from the earth in jets. The steam is piped to a powerhouse where it generates electricity.*



REVIEW QUIZ—NEW ZEALAND

Copy the statements below, filling in the blanks with an appropriate word or phrase.

1. The distance from the northern to southern tip of New Zealand is almost 14° or .... miles.
2. New Zealand became a British colony in ....
3. The highest mountain in New Zealand is ....
4. The range between New Zealand's winter and summer temperatures is small because ....
5. Most of New Zealand's lakes are situated on .... Island.
6. New Zealand has more potential hydro-electric power for its area than Australia because ....
7. About 90% of New Zealand's exports consist of ....
8. New Zealand's cattle ranches and sheep runs differ from Australia's because ....
9. One factor which enables New Zealand's dairy products to sell profitably in European markets is ....
10. New Zealand's factories differ from Canadian factories because ....
11. New Zealand's density of population is about .... as great as Canada's.
12. The two main types of people who live in New Zealand are the .... and ....
13. Five of New Zealand's largest cities are ....
14. Three leading exports of New Zealand are ....
15. New Zealand's government is very similar to the government of the United Kingdom because ....

The Commonwealth in the West Indies

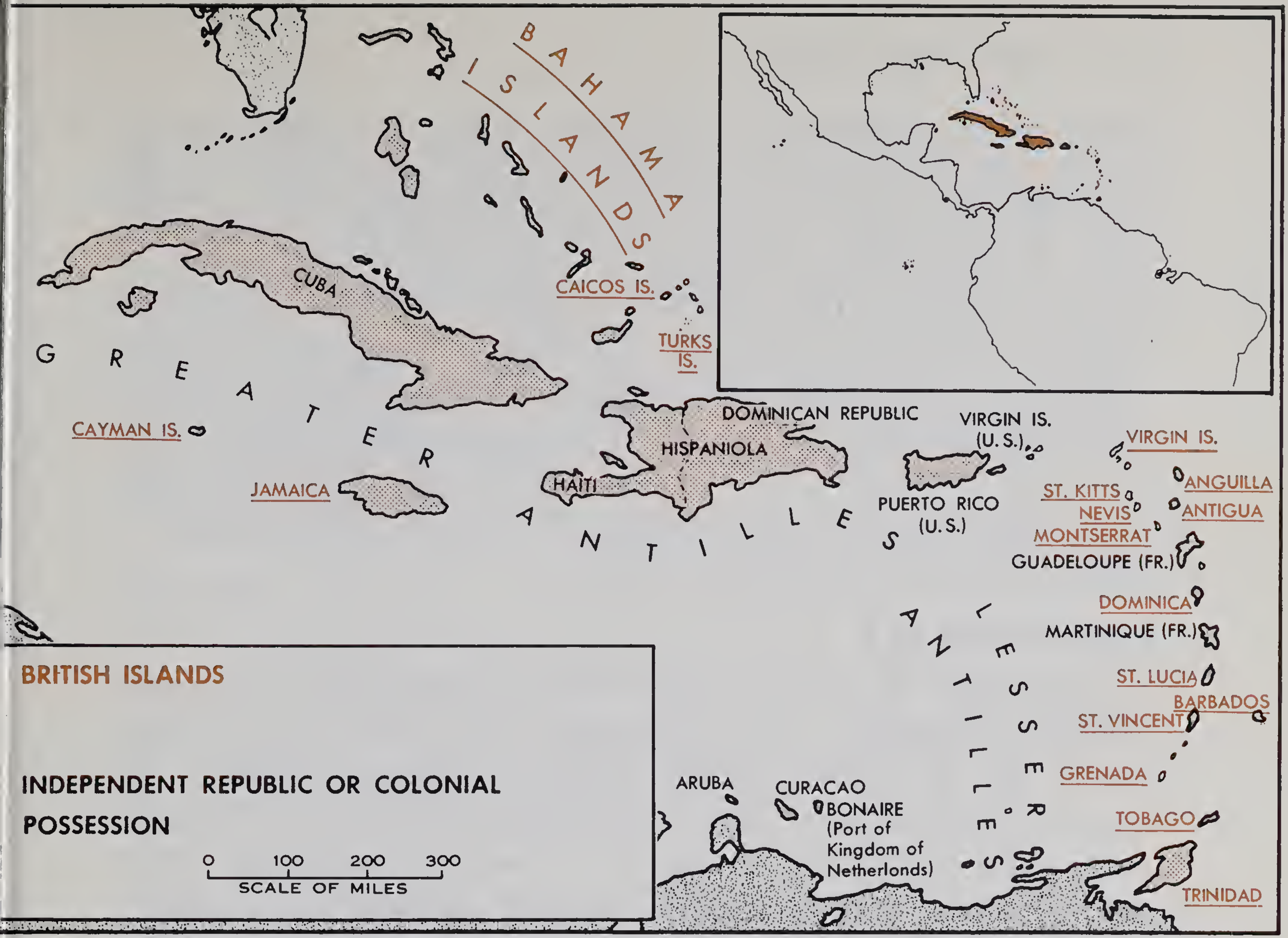
Map 1 The West Indies consist of a chain of over 1,000 islands, arcing for 2,000 miles between the Gulf of Mexico and the southern waters of the Caribbean Sea. On these islands are several independent nations and numerous colonies. We have special interest in several British colonies and in Jamaica and Trinidad-Tobago, both of which are independent members of the Commonwealth of Nations.

The Commonwealth in the West Indies

Country or Colony	Area (sq. mi.)	Population	Pop. Dens. (persons per sq. mi.)	Political Status
Jamaica	4,411	1,700,000	385	Independent Commonwealth member
Trinidad-Tobago	1,980	828,000	418	Independent Commonwealth member
Windward Islands[1]	825	333,000	404	Colonies
Barbados	166	237,000	1,422	Colony
Leeward Islands[2]	423	139,000	329	Colonies
British Virgin Islands	67	7,000	104	Colonies

[1] Dominica, St. Lucia, St. Vincent, Grenada
[2] Antigua, Montserrat, St. Kitts, Nevis, Anguilla

The West Indies are usually divided into two groups — the Greater Antilles and the Lesser Antilles. Jamaica, which is twice


BAHAMA ISLANDS
CUBA
CAICOS IS.
TURKS IS.
GREATER ANTILLES
CAYMAN IS.
JAMAICA
DOMINICAN REPUBLIC
HISPANIOLA
HAITI
VIRGIN IS. (U.S.)
VIRGIN IS.
PUERTO RICO (U.S.)
ST. KITTS
NEVIS
ANGUILLA
ANTIGUA
MONTSERRAT
GUADELOUPE (FR.)
DOMINICA
MARTINIQUE (FR.)
ST. LUCIA
BARBADOS
ST. VINCENT
GRENADA
TOBAGO
TRINIDAD
LESSER ANTILLES
ARUBA
CURACAO
BONAIRE
(Port of Kingdom of Netherlands)
BRITISH ISLANDS
INDEPENDENT REPUBLIC OR COLONIAL POSSESSION
0
100
200
300
SCALE OF MILES

Map 1. Political Regions.

the size of Prince Edward Island, is considered a member of the Greater Antilles, along with Cuba, Hispaniola, and Puerto Rico. Trinidad-Tobago and the British colonies are in the Lesser Antilles. As its name suggests, Trinidad-Tobago consists of the separate islands of Trinidad and Tobago. Tobago is much smaller than the island of Trinidad; its area is only 116 square miles compared to the 1,864 square miles of Trinidad. British colonies in the West Indies include several islands in the Leeward and Windward Islands, as well as the island of Barbados. Although the Bahama Islands are British and lie within 70 miles of the Greater Antilles, they do not form part of the West Indies. Other British territories in the Caribbean area are British Guiana in South America and British Honduras in Central America.

Fig. 5

Discovered by Columbus in 1492, the West Indies were long controlled as colonies by several European nations. Jamaica was under British influence for more than 300 years. Until the end of the 19th century, it was controlled by "sugar barons", who ruled the area with the backing of the British government. In 1958 most of the British colonies were united into the Federation of the West Indies, which included Antigua, Barbados, Dominica, Grenada, Jamaica, Montserrat, Trinidad, Tobago, St. Lucia, St. Vincent, St. Kitts, and Nevis. Because Jamaica in 1961 voted to leave the Federation, plans to make the organization a single nation had to be abandoned. In 1962 both Jamaica and Trinidad-Tobago gained their separate independence, leaving the smaller islands to group themselves as best they could.

LANDFORMS

The islands of the West Indies are the tops of an old, eroded chain of mountains partly submerged by the seas. Some of the islands are of volcanic origin. Others, including Jamaica, are formed from coral limestone. The surface of Jamaica is dominated by a central plateau and by the Blue Mountains in the east, which rise more than 7,500 feet above sea level. A coastal plain reaches its greatest width in the south. A much-indented coast provides numerous good harbours.

Three mountain ranges cross the island of Trinidad in an east-to-west direction. Running parallel to each other, the ranges *Fig. 5* separate areas of rolling plains. Nearby Tobago has a hilly surface. Mountainous terrain is also characteristic of the other islands of the Lesser Antilles.

CLIMATE AND NATURAL VEGETATION

Jamaica is only 18 degrees, or 1,260 miles, north of the equator, and the other West Indian parts of the Commonwealth and Empire are even closer to the equator. Trinidad is a mere 10 degrees, or less than 700 miles, north of the equator. As a result, lowland temperatures range between 70°F. and 90°F. throughout the year. Highland areas are, of course, cooler with frosts occurring in the *p. 19* Blue Mountains of Jamaica. Prevailing Northeast Trade Winds reduce the heating effects of the tropical sunlight and bring heavy rainfall to windward slopes. More than 200 inches of rain falls on high windward slopes in Jamaica, Trinidad, and the Windward Islands. This is almost ten times the average annual precipitation in Alberta. Leeward slopes and low-lying islands, on the other hand, suffer from a shortage of rainfall — some rainshadow areas receive less than 30 inches of rain. Violent tropical storms, known as hurricanes, are common in many of the northern islands. Characterized by high winds, rain, thunder, and lightning, these destructive storms usually arrive between May and November, and especially in September and October. *p. 18*

Thick forests of tropical hardwoods thrive on the wetter slopes. Mahogany, cedar, pine, rosewood, and logwood are typical species found. Woods for cabinet-making and cedar for cigar boxes are cut in these forests. Ferns abound in the damp forests. Scrub and tropical grasslands replace the forests in drier areas. Bamboo grows in many areas, and such tropical flowers as orchids and bougainvillea bloom in profusion throughout the islands.

THE PEOPLE

Most of the inhabitants of the West Indies are the descendants of former Negro slaves who were brought to the Indies to work on plantations. There are also a large number of descendants of East Indians and Chinese who came to the islands as sugar workers after slavery was abolished. The long period of European control has also contributed a small minority of whites to the population. In addition, there are people whose ancestors came from the Middle East as traders. Much intermarriage among racial groups has resulted in many people of mixed blood. Indeed, Jamaica's national motto is "Out of Many, One People". *Fig. 1*

Most of the people speak English, but on some of the islands French and Spanish are used. Christianity is well established, and both Roman Catholics and Protestants are numerous. Elementary schools are common, and a majority of the West Indians can read and write. However, comparatively few of them graduate from secondary schools or universities.

Overpopulation Overpopulation is a serious problem on many of the islands. Barbados with 237,000 persons on an island only 21 miles long and 14 miles wide has one of the highest population densities in the world, namely 1,422 persons per square mile! Trinidad-Tobago has over 400 persons per square mile and Jamaica has 385. Compare this with Canada's density of less than 5 people per square mile. Because agriculture is still the main source of jobs and personal income, these densities are too high to allow an adequate standard of living. As a result, poverty is widespread, and permanent and seasonal unemployment are very common. Many West Indians must live in small, crowded homes with no facilities for good health or pleasant living conditions. They enjoy few of the luxuries that are available to most Canadians. Despite their hardships, West Indians love to sing and dance. The islands are famous for calypso music and for folk dances, such as the limbo, shango, and bongo.

Cities The two largest cities, Kingston and Port of Spain, are both smaller than Calgary. Kingston is the capital and chief commercial centre of Jamaica. Located on a bay that provides the city with the world's seventh largest natural harbour, Kingston *Fig. 3* (145,000) has become Jamaica's chief port. Port of Spain (120,000) is the capital, chief port, and leading commercial centre of Trinidad. Lack of industry limits the size and number of cities and towns. Most urban centres of the islands are local centres of trade and distribution rather than large centres of commerce and industry.

INDUSTRIES

Agriculture The generally hot, wet tropical climate stimulates plant growth in the West Indies, so that agriculture is a major industry. Despite serious erosion and leaching problems, many areas have good soils. The excellent market for tropical farm products offered by the prosperous peoples of the United States and Canada also stimulates agricultural activity. However, slow development of other industries is the basic reason why agriculture remains the major source of employment and exports. Problems facing West Indian farmers include soil erosion and exhaustion, plant diseases and insects, hurricanes and floods, and a lack of modern farm equipment and supplies.

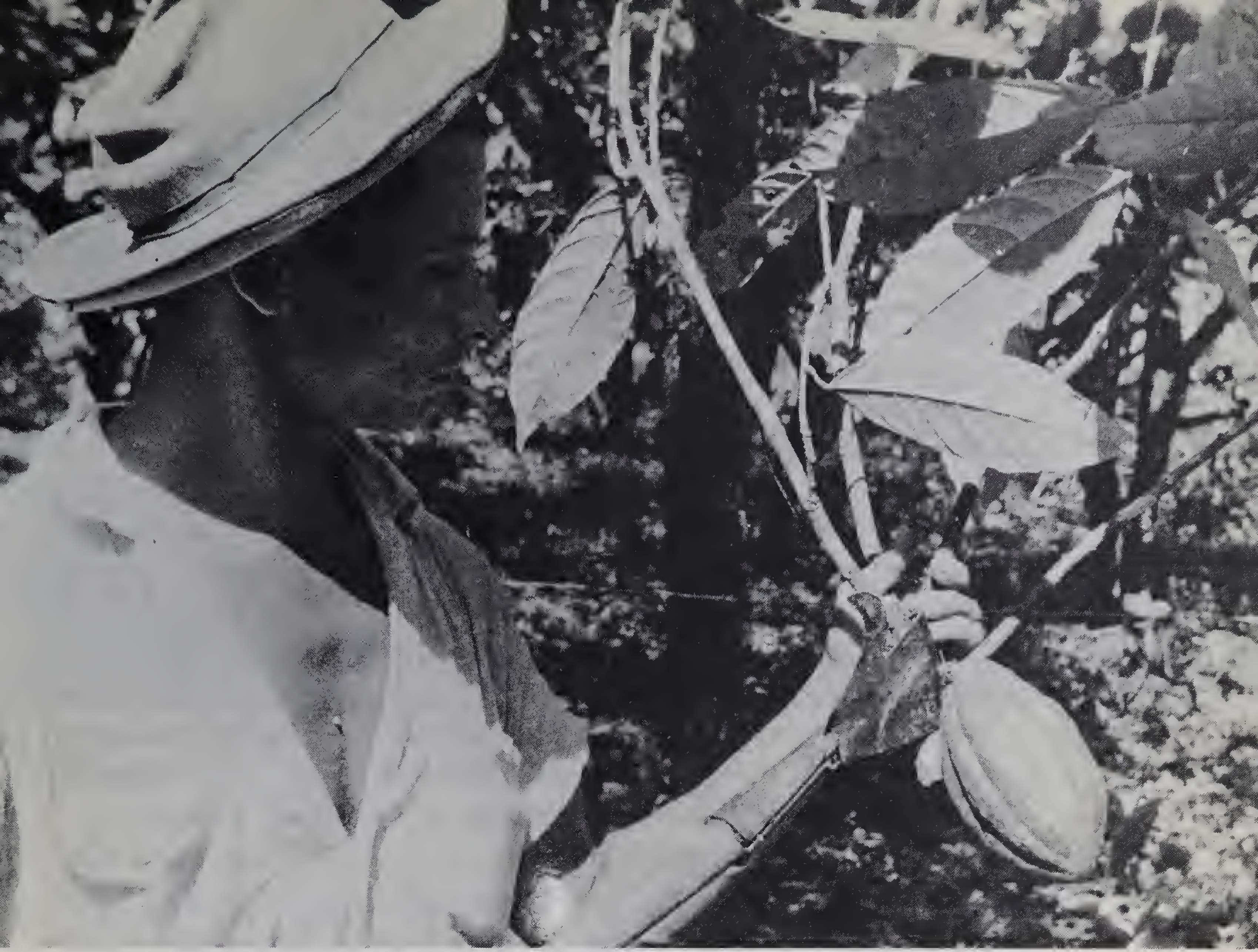


Figure 1. Picking cacao pods.
Cacao trees, which grow to about 25 feet in height, produce large, melon-shaped pods about 10 inches long. The pods grow on short stems and are cut off with a specially shaped tool. Inside the pod are seeds, from which cocoa is made. The seeds are dark brown or purple and are the size of a lima bean.

During their period of control, Europeans established many large estates that produced vast quantities of tropical products. Many estates are still operating under European management, but small holders are producing an increasingly larger share of the agricultural output.

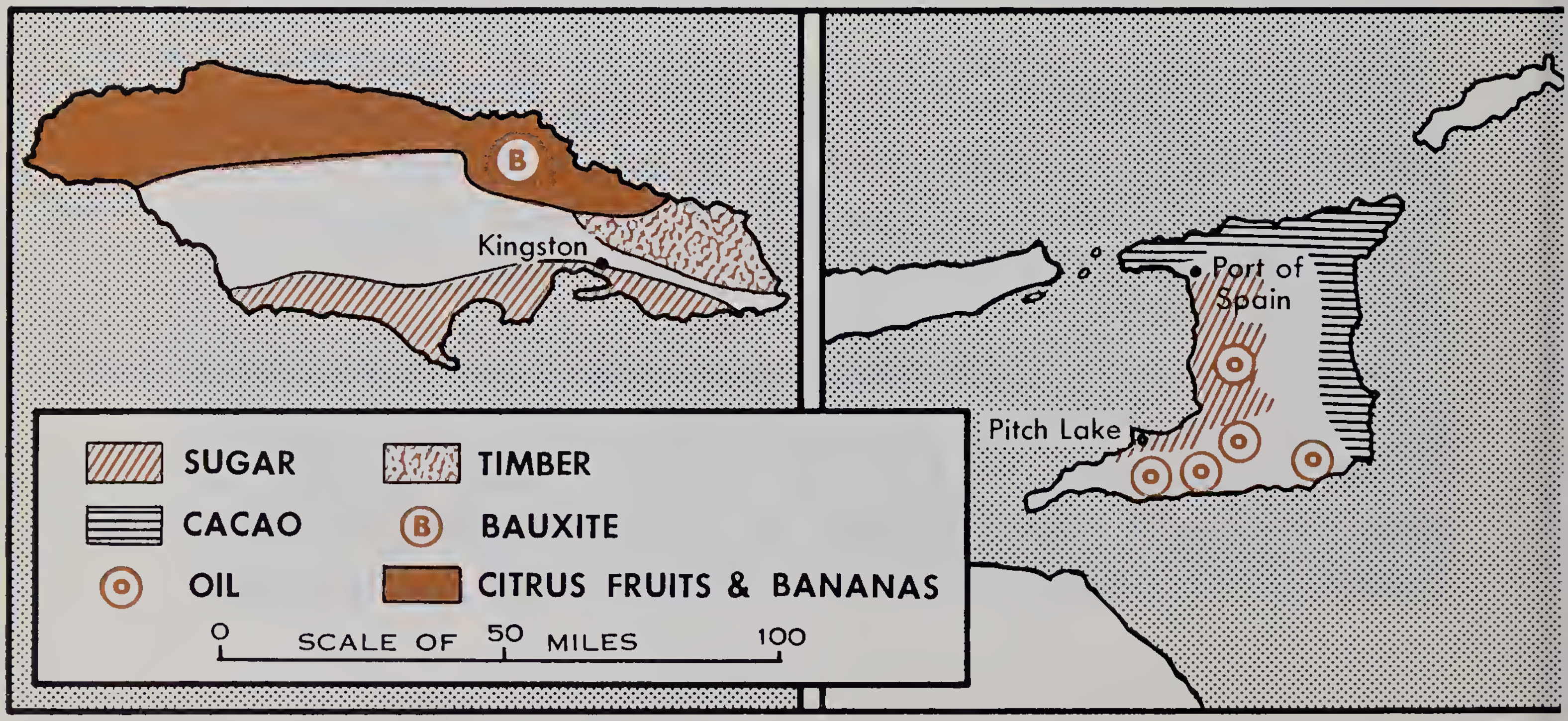
Cane sugar is the outstanding crop. Chief areas of production are the drier parts of Jamaica and Trinidad, as well as the islands of Barbados, Antigua, St. Kitts, and St. Lucia. Sugar is the major crop of Jamaica and Trinidad, and normally makes up three-quarters of the exports of Barbados. To plant cane sugar, a piece *Fig. 4* *Map 2* of cane with one or more joints is placed in the soil. Three or four stalks grow from each of the joints. The stalks often reach heights of twelve feet. Usually it takes about eighteen months for the cane to ripen ready for cutting. Such a long growing period requires that temperatures remain about 80°F. for almost all of the year. Other requirements for the cultivation of sugar cane are (a) either heavy rainfall or irrigation water, (b) a sunny dry season for ripening and harvesting, (c) fertile top soil with good water-holding qualities, and (d) a porous subsoil to provide good drainage. The juice extracted from the canes is refined to produce crystals of sugar and a residue of molasses. Much of the molasses is used in the manufacture of rum.

Fig. 1 Cacao trees, with their valuable beans, thrive in the wetter parts of Jamaica, Trinidad, and the Windward Islands, and cacao is the second crop of the islands. Bananas are also important in the wetter areas. They are picked while still green and shipped in refrigerator ships to the United States, Canada, and Europe.

Other important crops include citrus fruits, arrowroot, spices, yams, sweet potatoes, papaya, pineapples, tobacco, coffee, and cotton. Unfortunately, sufficient food to feed all the people of the islands cannot be grown, and large food imports are necessary.

Fishing Fishing is excellent in the waters surrounding the islands. Kingfish, Spanish mackerel, bluefish, tuna, and marlin

Map 2. Land Use in Jamaica and Trinidad.



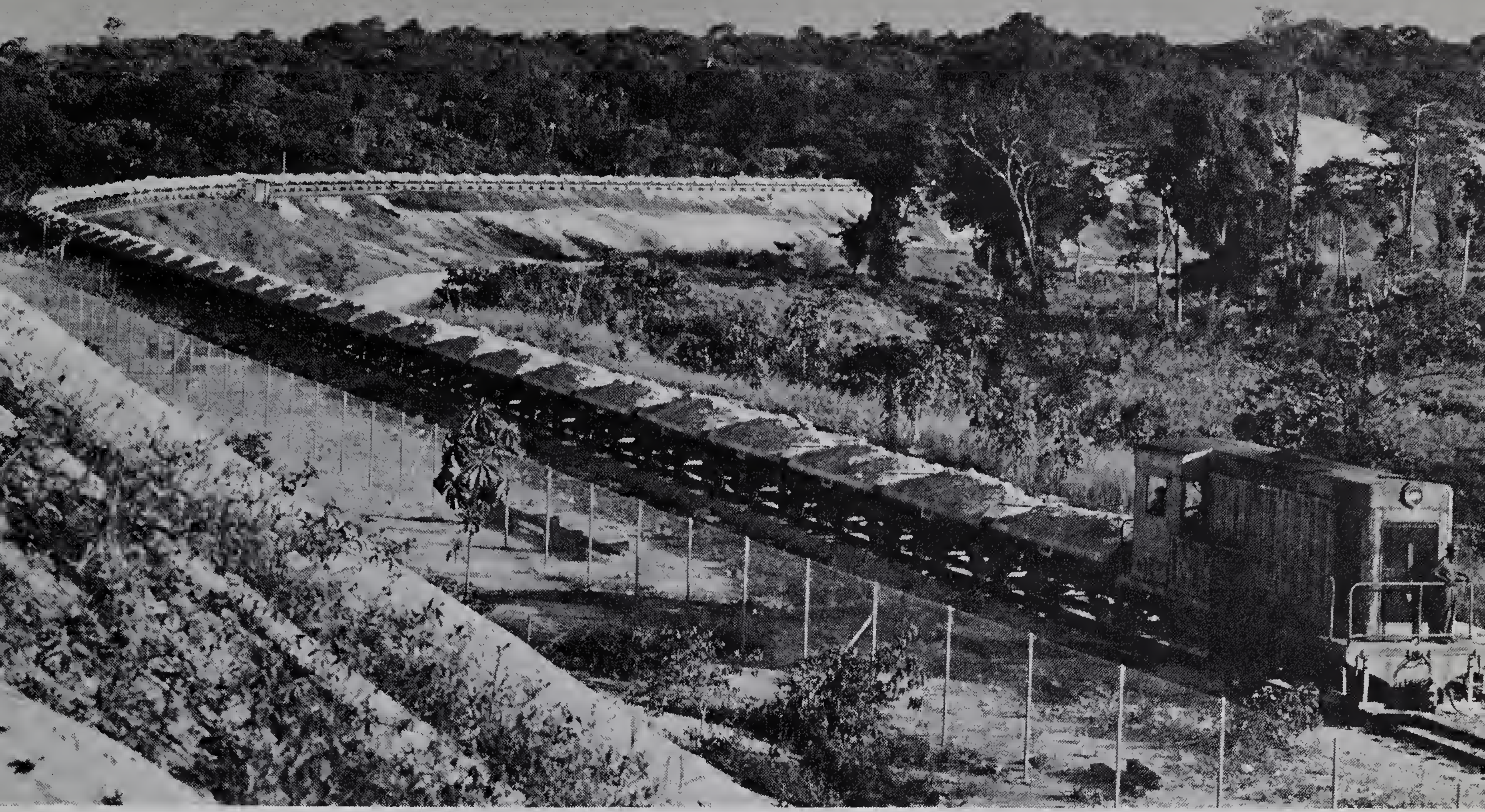


Figure 2. Transporting bauxite in Jamaica.
This ore is being taken by rail to the refinery where it will be processed and shipped, in the form of alumina, to the smelter at Kitimat in British Columbia.

are the chief types of fish caught. Lobsters, shrimps, oysters, clams, crabs, and other shellfish are numerous. Although coastal inhabitants have worked nearby fisheries for centuries, large-scale commercial fishing as found off the east and west coasts of Canada is just beginning. Indeed, the West Indies has long been a major market for fish caught in Canada's Atlantic fisheries. In recent years, the island governments have begun a programme to encourage commercial fishing by providing better fish marketing facilities and by lending money for the purchase of modern fishing equipment. Canadian fisheries experts have assisted in the programme.

Sport fishing for kingfish, tuna, marlin, and other game fish is a major tourist attraction of the West Indies. Also popular with visitors is the exciting sport of skindiving, which provides tourists with a thrilling view of the beautiful coral formations and colourful aquatic life of the tropical Caribbean Sea.

Tourism Hundreds of tourists flock to the West Indies every year. They are attracted by the perfect swimming and sunbathing weather, the lovely palm-fringed beaches of white coral sand, the crystal-clear waters of the ocean, the deep green forests of the scenic mountainous interiors, the picturesque towns, the fascinating historic sites dating back to buccaneer days, and the friendly and colourful people of the islands. Several international airlines and major shipping companies offer excellent transportation for the tourists, most of whom come from Europe, the United States, and Canada to escape the unpleasantness of the northern winters. Of every 50 tourists that visit the West Indies, 45 are Americans, 4 are Canadians, and 1 is a European. Serving the needs of these tourists provides employment and revenue for the peoples of the islands. Because income taxes in the region are low, Canadian investors are attracted to this part of the world. Many of the new and expanded tourist facilities are being built by Canadians.

Mining Minerals do not occur in great variety in the West *Fig. 2* Indies, but there are significant deposits of petroleum, bauxite, and gypsum. Trinidad ranks second only to Canada as a producer of petroleum in the Commonwealth. However, by world standards, production is small. Trinidad also has the 114-acre Pitch Lake, the largest single deposit of natural asphalt in the world. Asphalt is a sticky, black substance used for paving, roofing, and other projects requiring a hard-wearing, waterproof surface.

Reddish-brown earth containing the valuable mineral bauxite covers more than a quarter of Jamaica. Undeveloped until the 1950s, the bauxite deposits of Jamaica are now that country's biggest dollar earner. Jamaica is the world's largest supplier of bauxite, producing more than a tenth of the world's supply. The United States and Canada are the chief customers for Jamaican bauxite; both countries are major producers of aluminum and both lack home supplies of bauxite. Approximately 50 per cent of the bauxite imported by the United States comes from Jamaica. Processing of the ore is carried out in plants located in the United States rather than in Jamaica.

The Canadian-owned Alcan Jamaica Company pioneered in the development of the island's bauxite industry. It owns large plants on the island that reduce bauxite to alumina, a white powder that contains a much higher concentration of aluminum than does

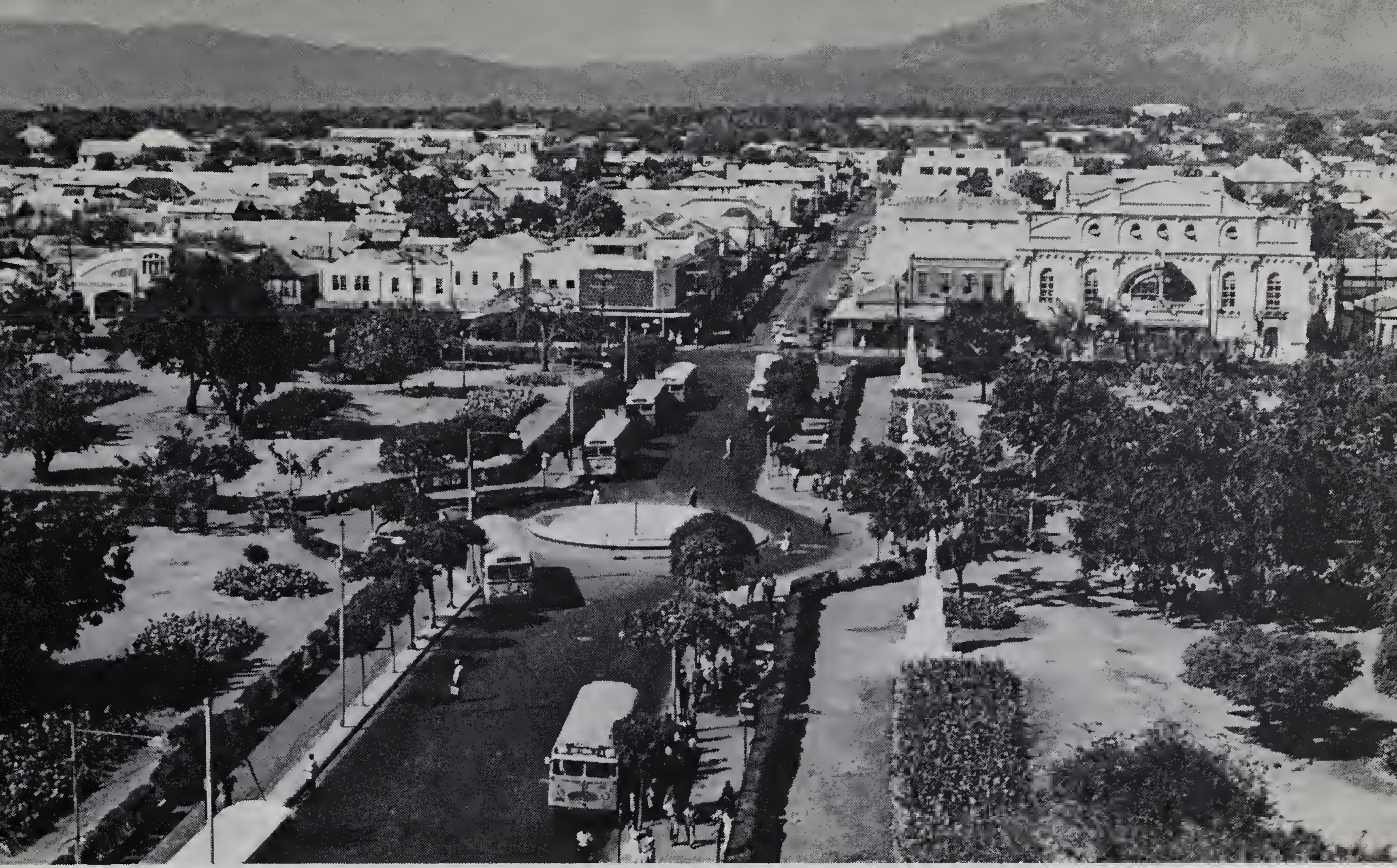


Figure 3. Kingston, Jamaica.
Many of the stores and offices are on King Street, the centre of the city's business section. Industries are growing up on the outskirts of the city, and residential suburbs have spread to the hills in the background.

unprocessed bauxite. Since alumina takes much less shipping space than does bauxite containing the same amount of aluminum, the reduction process results in lower transportation costs between Jamaica and Alcan's huge smelter at Kitimat in British Columbia.

Jamaican bauxite is mined by standard open-pit methods, but the land reclamation measures employed after mining are unique. When bauxite mining operations are completed, the aluminum companies attempt to restore the mined-out areas to the same agricultural, pastoral, or forest productivity as existed before the mining operations were begun. The companies also relocate farmers displaced by mining operations and assist them in building better homes and using improved farming methods. In addition, the roads, railways, and port facilities built by the aluminum companies have greatly improved the transportation system of Jamaica. In addition to bauxite, the island also has large deposits of gypsum, *Fig. 2* a mineral used in the manufacture of cement, plaster, and fertilizers.

Manufacturing All of the larger islands have sugar mills, rum distilleries, and other plants to process locally grown farm produce. Numerous small factories produce shoes, textiles, beverages, glassware, plastics, chemicals, and other light consumer goods for local use only. Large-scale industries producing machinery, motor vehicles, and other types of heavy manufactured goods are almost unknown in the islands. Major exceptions to the pattern are oil refineries in Trinidad, and alumina, cement, and fertilizer plants in Jamaica. As well as handling local supplies of petroleum, Trinidad's refineries also process crude oil from nearby Venezuela.

Several factors hinder industrial development on the islands. With the exception of petroleum in Trinidad, fuels are scarce. Cheap fuels to burn in thermal plants are lacking, and most of the rivers are unsuitable for hydro-electric power production. Few raw materials are available for manufacturing. The people of the West Indies have had little opportunity to develop industrial skills and because of their low standard of living, offer only a poor market for industrial goods. Little money for investment in industrial plants can be found among the islands' inhabitants, and most industries have been built with foreign capital.

Figure 4. Cutting and loading sugar cane.
Cane is grown from short sections of old cane stalks. When the plants have grown from ten to fifteen feet high, they are cut, usually by hand, as in the picture, but sometimes by machine. The machine in the background is loading cane onto a truck for transporting to the factory.

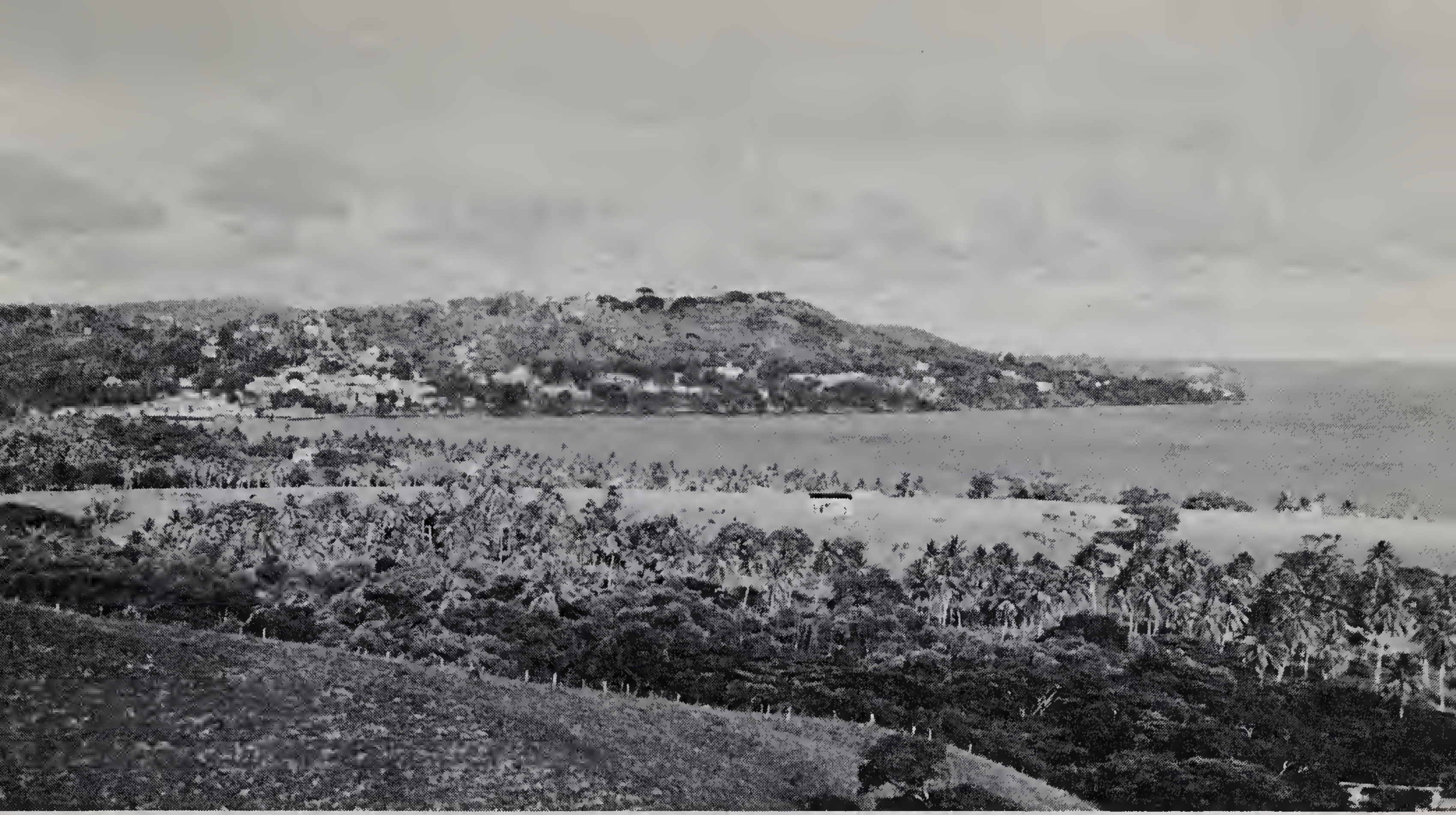


Figure 5. View of Scarborough, Tobago.
The island of Tobago is only 116 square miles in area. Scarborough is the chief town on the island. In the background is the town, with a small harbour on the left. In the foreground there is a park and sports ground.

TRADE AND TRANSPORTATION

Petroleum and petroleum products are the principal exports of Trinidad, and bauxite and alumina provide about half the value of Jamaica's exports. Otherwise, exports consist mainly of tropical farm products. Major imports include food, especially wheat, and a wide range of manufactured goods. The United Kingdom, the United States, and Canada are the major trading partners of the West Indian Commonwealth nations. From the West Indies, Canadians buy such items as alumina, sugar, rum, cocoa, coffee, citrus fruits, bananas, copra, and spices, and sell in return such products as flour, fish, meats, tobacco, lumber, newsprint, machinery, automobiles, and a large variety of consumer goods. Most of the larger islands, particularly Trinidad, Jamaica, and Barbados, have good roads in most areas and are well serviced by international shipping and airline companies. Interisland shipping is available but is inadequate in many areas. Railway mileage is very low; most long-distance travel on the islands is done by bus. Few people can afford to own an automobile.

Map 2

PROBLEMS AND CONCLUSION

Overpopulation, poverty, and unemployment are the biggest problems facing the peoples of the West Indies. In Jamaica, for example, as much as 20 per cent of the labour force is usually unemployed. The roots of these problems lie in a shortage of large fertile lowlands, low rainfall in several areas, poor standards of health and education, and generally inadequate supplies of fuel, raw materials, skilled workers, and investment capital for the large-scale development of manufacturing industries. The economy of the islands depends too much upon tropical farm products, bauxite, petroleum, and tourism. A decline in any one of these industries can cause severe hardship to many people. Financial, technical, and educational assistance from Canada and other more favoured lands is needed to develop these crowded and underdeveloped islands. *Fig. 1*

WORK UNIT —

The Language of Geography Add to your reference list, definitions of the following terms: eroded mountains, hurricane, calypso, porous soil, gypsum, asphalt, land reclamation, alumina.

Problems and Projects

1. Select the part of the Commonwealth in the West Indies that you would most like to visit for a vacation. Give reasons for your choice, and discuss such topics as the best time of year to make your trip, the clothing you would need, the route you would take, foods you would eat, things you would do for recreation, special places you would visit, and the people you would meet.
2. Suggest some of the things that might be done to improve the standard of living in the West Indies.
3. List the items in your home that might have come from the West Indies.
4. Describe the process by which a coral island is formed.
5. Describe the source, method of production, use, and export markets of the following: (a) cacao, (b) asphalt, (c) arrowroot starch.

REVIEW QUIZ

Copy the statements into your notebook, completing each one.

1. The West Indies consist of more than .... islands.
2. The West Indies are usually divided into two groups, the .... and the ....
3. The West Indies were discovered by .... in ....
4. Jamaica and Trinidad-Tobago gained their independence in ....
5. Rain is brought to the windward slopes of the islands by the .... winds.
6. Hurricanes usually occur in the months of ....
7. Most of the inhabitants of the West Indies are descendants of ....
8. Jamaica's national motto is ....
9. Some of the folk dances originating in the West Indies are the ...., ..., and ....
10. The number and size of the cities and towns are limited because of ....
11. The major industry throughout the West Indies is ....
12. Some of the problems facing West Indian farmers are .... , ..., and ....
13. Sugar is the major crop of .... and .... It usually takes .... months for sugar cane to ripen.
14. The conditions necessary for the cultivation of sugar cane are ...., ..., ..., and ....
15. The most significant minerals occurring in the West Indies are ...., ..., and ....
16. The biggest dollar earner for Jamaica is her supply of .... The principal markets for this mineral are .... and ....
17. Industrial development is hindered because of .... , ... , ..., and ....
18. Major imports into the West Indies are .... and ....
19. Canada buys from the West Indies such items as ...., ... , ..., ..., ..., ..., ..., ..., ...
20. Canada sells to the West Indies such items as ...., ..., ..., ..., ..., ..., ..., ...

Other Commonwealth Members and Dependencies

Scattered around the world are many other members of the Commonwealth family. Some of them are small, but each of them makes a useful contribution to the family welfare.

THE COMMONWEALTH IN THE MEDITERRANEAN

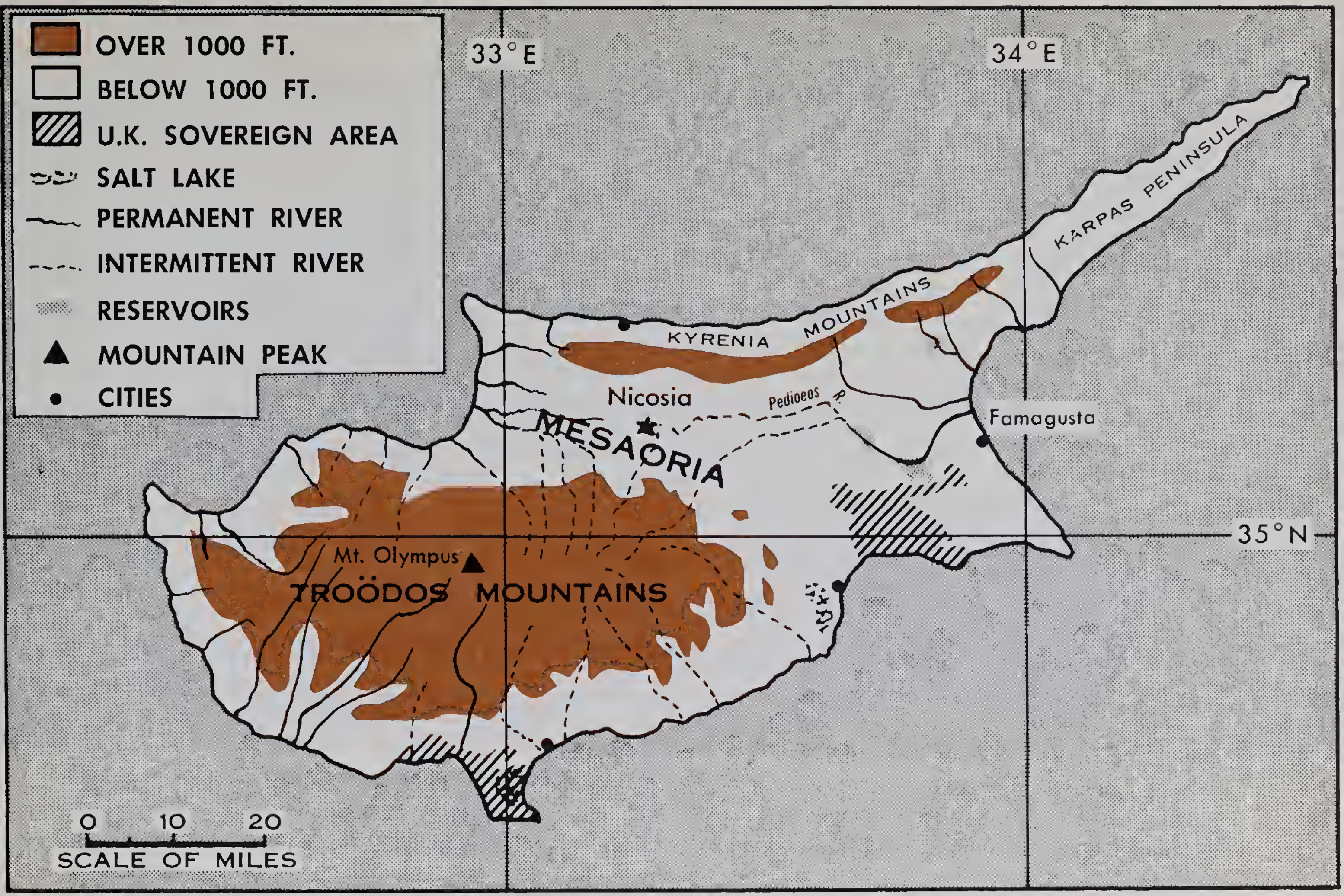
Commanding the sea routes through the Mediterranean are Gibraltar and the islands of Cyprus and Malta. These strategically important areas are members of the Commonwealth family. *Map 1*

CYPRUS

The island of Cyprus is situated in the eastern Mediterranean some sixty miles off the Turkish mainland. It is about one and a half times the size of Prince Edward Island and has a population of just over half a million people.

The surface of Cyprus consists of two mountain groups separated by a central plain, the Messaoria. The coast is rocky and has no fine harbours. During the hot, rainless summers, most of the rivers run dry, but they reach the sea during the mild, wet winters. The annual rainfall on the plain averages only 15 inches, although the highest parts of the island receive double that amount.

The most fertile part of the island is the Messaoria lowland, but during the hot, dry summer, the soil must be irrigated. The crops that are produced are typically Mediterranean. The most important tree crops are olives, figs, and citrus fruit; wheat and barley are the


OVER 1000 FT.
BELOW 1000 FT.
U.K. SOVEREIGN AREA
SALT LAKE
PERMANENT RIVER
INTERMITTENT RIVER
RESERVOIRS
MOUNTAIN PEAK
CITIES
33° E
34° E
35° N
KARPAS PENINSULA
KYRENIA MOUNTAINS
Nicosia
Pedioeos R.
MESAORIA
Famagusta
Mt. Olympus
TROÖDOS MOUNTAINS
0 10 20
SCALE OF MILES

Map 1. Cyprus: Landforms

chief cereal crops. Substantial quantities of potatoes, grapes, and tobacco are also raised. The majority of Cypriots work at some form of agriculture.

Copper derives its name from Cyprus. In ancient times, Cyprus was the principal source of copper, and the metal became known as the "Cyprian metal." Quantities of copper are still mined on the island, and it, with some iron, gypsum, and asbestos, is the principal export from Cyprus.

Four-fifths of the inhabitants of Cyprus are of Greek ancestry. They speak the Greek language and belong to the Greek Orthodox Church. Most of the other inhabitants are Moslems of Turkish origin who speak the Turkish language. Hostility between these two groups has been the nation's most pressing problem in recent times. After a long period of violence, Cyprus was granted its independence in 1960. It is now an independent republic with a Greek president who is elected by the Greek population, and a Turkish vice-president elected by the Turkish population. In 1961 Cyprus was accepted as a member of the Commonwealth.

MALTA

Malta became a self-governing British colony in 1961. It consists of a group of three islands lying in the central channel that links the eastern and western Mediterranean. The islands are very small with a total area of only 121 square miles. Because of its strategic location and a very fine harbour at Valletta, Malta was a major British naval base for more than 150 years.

The surface of Malta is rough, consisting of ridges, valleys, and plateaus. As a result, most fields are small terraced strips protected by stone walls. In these fields the Maltese raise wheat, barley, and vegetables of all kinds. Grape vines and fruit trees are also cultivated throughout the islands.

More than 325,000 people live in Malta's small area. With a population density of over 2,700 people per square mile, the islands are seriously overcrowded. The resultant poverty has led to widespread emigration, mostly to other parts of the Commonwealth. Valletta, the capital, has a population of 18,500 and is an important port of call for ships routed through the Suez Canal.

GIBRALTAR

Fig. 1 The rocky fortress of Gibraltar has been a British crown colony since 1713. It consists of a rocky peninsula, two square miles in area, jutting out into the Mediterranean from the southern tip of Spain. Separated from the African coast by the narrow Strait of Gibraltar, Gibraltar guards the passage between the Atlantic Ocean and the Mediterranean Sea.

"The Rock of Gibraltar" rises 1,396 feet above the water and occupies most of the colony. This huge rock has been made into a strong fortress. It bristles with big guns; and great quantities of ammunition, food, and water are stored in tunnels and caves that honeycomb it. One of the attractions of The Rock is a colony of tailless Barbary apes that live there. There is a legend that, as long as there are apes on The Rock, Gibraltar will remain in British hands.

Gibraltar has a population of about 26,000. The native population is of Italian, Portuguese, and Spanish descent and is Spanish-

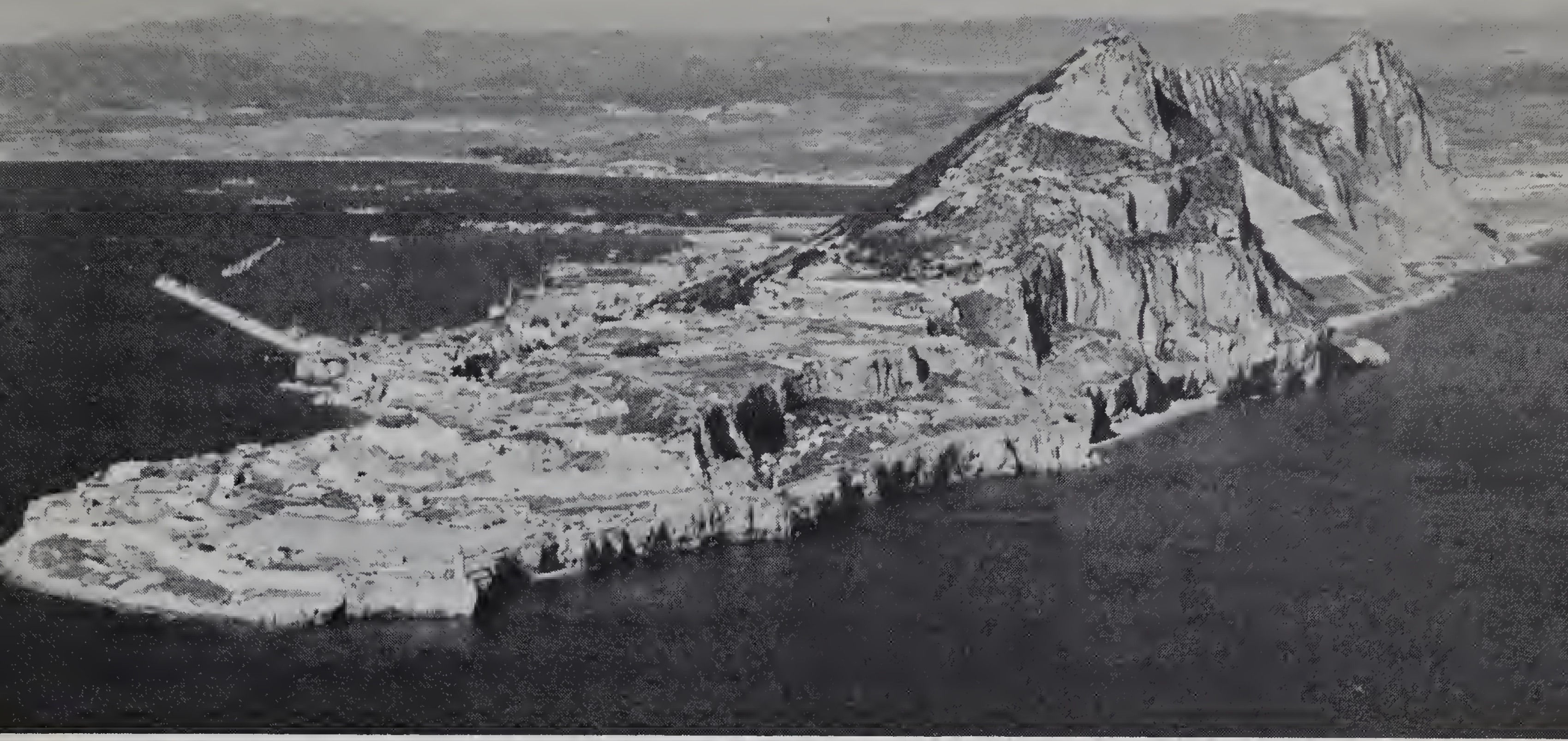


Figure 1. An Aerial View of Gibraltar
Guarding the western entrance to the Mediterranean Sea, the Rock of Gibraltar bristles with great guns and is honeycombed with tunnels for the use of the armed forces stationed there. The huge rock, towering 1,408 feet above the water, drops steeply to the sea on the east. To the west lies a naval base with a huge natural harbour, and beyond the Rock is a low isthmus that connects the colony to the Spanish mainland, seen in the background. On the right side of the Rock can be seen cement catchment areas, built to collect rainwater.

speaking. However, there is always a large English population made up of officials and service personnel. Its pleasant climate has made Gibraltar a popular tourist resort.

HONG KONG

Hong Kong is a British colony on the south coast of China. It is situated about 90 miles south of the large Chinese coastal city of Canton. The colony consists of an island and an adjacent portion of the mainland. Altogether, Hong Kong has an area of 390 square miles in which live more than three million people, nearly all of whom are Chinese.

Hong Kong is one of the few points of contact between Red China and the free world. The colony has become the centre for free-world trade with China and for information about events in China. In recent years, thousands of refugees from Red China have escaped to Hong Kong.

Hong Kong has become so densely populated that life is very difficult for most of its inhabitants. There is a serious shortage of housing, and thousands of people live in squatter shacks and on houseboats. It is estimated that one-fifth of the population is without any regular housing at all. The shortage of agricultural land makes Hong Kong dependent on the Chinese mainland for half its food, and many people go hungry. The colony also suffers from a shortage of water because it depends on rain for its water supply. There is a winter dry season and reservoirs are inadequate, so that the use of water must always be limited.

To support the population, industry has been expanded. The chief industries are the manufacture of textiles and light consumer goods. Many of the inhabitants of Hong Kong are fishermen, who live on their boats and fish by night. They use the traditional method of luring the fish by lights.

The capital city of Victoria lies on the north shore of Hong Kong island. It has one of the largest and most beautiful natural harbours in the world. Indeed, the name Hong Kong means "fragrant harbour."

THE BERMUDA ISLANDS

Nearly six hundred miles out in the Atlantic off the eastern coast of North America, midway between Nova Scotia and the West Indies, lies the British Crown colony of Bermuda. The colony consists of over 300 coral islands, yet the total land area is only 20 square miles. Largest of the islands is Bermuda, which includes about three-quarters of the total land area. The islands are unique in that nowhere else in the world does coral grow this far north.

Coral islands are usually quite low and rather flat, but some of Bermuda's hills and ridges rise as high as 250 feet above sea level. Many of the hills are very steep, and often the limestone rocks that have formed from the coral have been eroded into fantastic shapes which overlook the beaches along the irregular shoreline.

The climate is very pleasant. Summer temperatures average 79°, and the average winter temperature is a mild 63°. The annual rainfall (most of which falls at night) averages 58 inches and is evenly distributed throughout the year.

It is fortunate that Bermuda receives this fairly heavy, well-distributed rainfall, because it has few other sources of fresh water. The rain is caught on house roofs and is conducted into large cisterns beneath each house. Large cement catchments have been built on the islands in an effort to maintain a reserve of fresh water.

Soils are very thin in Bermuda. They support the growth of palm trees, junipers, luxuriant grasses, and beautiful flowers, but cannot support much farming. Only about 1,400 acres are in farmland. Bermuda's main source of income is the tourist industry. The warm climate, excellent beaches, beautiful scenery, and fine hotels make the colony an ideal winter resort, attracting about 100,000 tourists annually. Deep-sea fishing, yacht racing, golfing, bathing, and cycling are added recreational attractions for the vacationer.

Exports include Easter lilies and other flowers, vegetables, and some drugs and medicines. Bermuda must import four-fifths of its food, along with manufactured goods and timber. Canada helps to supply Bermuda with these imports.

Transportation facilities in this remote island colony are good. Small boats connect the islands, and the larger islands are connected by bridges and causeways. Bicycles are the most widely used form of transport. Ocean steamers dock at *Hamilton* (3,000), the capital and chief town. The islands are also served by an airport from which regular flights are scheduled to Toronto, Montreal, and many cities abroad. So, even though Bermuda is remote, it is by no means isolated.

THE CROWN COLONY OF BRITISH GUIANA

The only Commonwealth member on the mainland of the South American continent is the Crown colony of British Guiana. It is located immediately east of Venezuela on South America's northern coast and is 83,000 square miles in extent. The population is a mere 585,000. The surface is crossed by many rivers along which are located some of the world's most spectacular waterfalls. Three of these falls are over 700 feet high, and one, King George VI Falls, drops 1,600 feet, which is ten times the drop at Niagara.

The land can be divided into three regions. Parallel to the coast is a low, narrow, very fertile, coastal plain. Behind it is a region of hilly country with fertile river valleys. Far inland, along the borders with Venezuela and Brazil, are wild, unexplored, mountainous areas with peaks rising as high as 9,200 feet.

Lying within ten degrees of the equator, British Guiana has a hot, humid climate, particularly in the lowlands. Georgetown, the capital, on the coast has an average annual temperature of 82° and an average rainfall of 89 inches. December through July is the rainiest period. Inland, temperatures and rainfall decrease as the land rises.

British Guiana is a land of great forests. Mangrove forests fringe the coast, and lush tropical rainforests cover most of the lowlands and the interior hill country. Drier parts inland are grasslands. Fierce animals and dangerous reptiles haunt these forests, and alligators lurk in the coastal waters. But the creature feared most by man and beast alike is the vicious piranha, a small, carnivorous fish which is found in nearly all the rivers.

The productive soils of the coastal lowlands have been drained and now support large sugar plantations. Rice, coffee, coconuts, and cacao are the other main crops.

Mining is very important to the economy. British Guiana is one of the greatest bauxite producers in the world; and a large proportion of the bauxite is shipped to Quebec and British Columbia to be made into aluminum. Diamonds and gold are other minerals mined for the export market.

The chief exports are bauxite, sugar, rum, timber, and diamonds. These are traded to Canada, Britain, the West Indies, and the United States, in return for machinery, automobiles, flour, textiles, and clothing.

The population of British Guiana is a mixture of many races. When Britain formed the colony in 1831, it was realized that the main drawback to its development was lack of population, and many East Indians were encouraged to come to the new country. As a result, the largest single racial group in British Guiana today is East Indian. There are also a large body of Negroes, some Europeans and Chinese, and many people of mixed blood. In the interior, there are nearly 20,000 American Indians. As in the West Indies, there are few persons who can claim ancestors of only one race. English is spoken by almost all people.

Transportation is a major problem in British Guiana. The rivers, because of their waterfalls, are navigable for only a short distance inland. Roads and railways together total only 600 miles. They serve only the coastal plain and the bauxite-producing area, leaving the vast hinterland cut off from the rest of the country. Most of the transportation routes converge upon *Georgetown* (120,000), the modern, well-planned, port city. If transportation facilities were extended, greater commercial development of this potentially rich, tropical, Commonwealth Colony might be achieved.

MINOR DEPENDENCIES

The Bahama Islands, a series of low-lying coral islands, lie off the southeast coast of Florida, north of Cuba. They include 20 inhabited islands and innumerable smaller islands and rocks. The total area of the island chain is 4,400 square miles.

Most of the inhabitants are English-speaking Negro descendants of freed African slaves. They raise crops of tomatoes and pineapples for export and engage in poultry-raising, dairy farming, and fishing to supply their own food requirements. The pleasant climate attracts many tourists to the Bahamas, and looking after their needs has become a major industry.

British Honduras is a colony located in Central America on the shores of the Caribbean Sea. It has an area of 8,867 square miles and a total population of only 83,000 people. More than 90 per cent of the country is forest, and forest products, such as mahogany and other valuable hardwoods are the principal exports. On the small area that is cultivated, corn and rice are raised for food.

The people are descended from many races. Some are Mayans, some are Spanish Indians, some are descended from African laborers who originally came to the West Indies, and some are descendants of English, German, and Scots traders. Nearly everyone speaks English although other languages and dialects are commonly used.

The Falkland Islands, a British colony off the southeast coast of Argentina, have only 2,250 inhabitants. The principal occupation of these people is the raising of sheep which thrive on the coarse grass that covers the bare, windswept islands. There are no native peoples, and the white, English-speaking population is descended from early Scottish settlers.

St. Helena is a volcanic island in the Atlantic Ocean, 1,200 miles off the west coast of Africa. Its rugged surface covers only 47 square miles and supports 4,700 inhabitants. They are English-speaking descendants of early British, Dutch, Portuguese, East Indian, and African settlers. On the one-fourth of the island that is cultivated, they grow crops of flax, coffee, potatoes, and green vegetables.

The Arabian Peninsula of southwest Asia has ties with the Commonwealth. Britain directly controls Aden Colony, which has an area of 80 square miles and a population of 140,000. Adjacent to Aden Colony are other territories governed by hereditary Arab rulers with British help and protection. They include the Aden Protectorate, Muscat and Oman, Trucial Oman, Qatar, Bahrein, and Kuwait. These associated countries have a combined area of more than 240,000 square miles and a total population of nearly two million people. Most of the area is desert, but it is important because it is one of the richest oil-bearing regions in the world.

Mauritius and the **Seychelles** are British island colonies in the Indian Ocean. Mauritius is a rugged, volcanic island fringed by coral reefs. It has an area of 720 square miles and a population of 615,000. Nearly three-quarters of the people are Indians whose forefathers came to work on sugar plantations in the 19th century. Cane sugar is raised on 90 per cent of the farm land and is the principal export.

The Seychelles are small islands of volcanic origin located near the equator off the coast of East Africa. The fertile volcanic soils, warm temperatures, and heavy rainfall are ideal for the production of coconuts, cinnamon, and vanilla which are raised for export. The 42,000 inhabitants are mainly European in descent, and most of them speak the French language.

Fiji is a British colony located in the western part of the South Pacific Ocean, about 1,100 miles north of New Zealand. It consists of more than 300 islands, of which 106 are inhabited. The larger islands are volcanic in origin with mountainous interiors and coral-fringed shores. The tropical climate and heavy, year-round rainfall enable the inhabitants to raise crops of cane sugar, sweet potatoes, citrus fruits, pineapples, coffee, rice, tobacco, and rubber.

The native Fijians are black-skinned people, who are noted for their friendliness and graceful dances. They live in villages of thatched houses and are ruled by chiefs. Most of them are Christians, and many of them speak English. The native population is outnumbered by Indians, whose ancestors came from India to work on the sugar plantations. The Indians live in scattered homes in the sugar-growing areas and in the smaller towns.

Other British territories in the Pacific are *Pitcairn, Tonga, British Solomon Islands*, and the *Gilbert and Ellice Islands.*

WORK UNIT —

The Language of Geography Add to your reference list, definitions of the following terms: emigration, crown colony, peninsula, refugee, textiles, coral, catchment, causeway.

Problems and Projects

1. Both Hong Kong and the Bermuda Islands lack a good supply of fresh water. How does each country solve this problem?
2. Prepare a travel folder that would entice people in your province to take a winter vacation in the Bermuda Islands. You might include such things as the climate, historic points of interest, recreational facilities, tourist accommodation, distance by air, and probable cost.

3. Why have Cyprus, Malta, and Gibraltar been so important to the Commonwealth? Find out why Malta was awarded the George Cross during World War II.
4. Contrast British Guiana with your own province under the headings: size, population, people, climate, agricultural products, and minerals.

Maps

On an outline map of the Western Hemisphere, trace the route taken by ships carrying bauxite from British Guiana to Kitimat in British Columbia.

REVIEW QUIZ

Most of the statements below are FALSE, but a few are TRUE. Copy the TRUE statements into your notebook. Make the FALSE statements true by correcting the underlined section of each statement.

1. Cyprus is about two times the size of Prince Edward Island.
2. The most important tree crops of Cyprus are olives, figs, and apples.
3. Copper, iron, gypsum, and silver are the principal mineral exports of Cyprus.
4. Cyprus' constitution requires the election of a Greek president and a Turkish vice-president.
5. Malta is very important to the Commonwealth because of its tourist attractions.
6. Gibraltar's population is about one-tenth that of Malta.
7. More than ten million people live in Hong Kong.
8. Besides overpopulation, another of Hong Kong's serious problems is its shallow harbour.
9. A serious problem faced by residents of Bermuda is lack of fresh water.
10. Bermuda's main source of income is its bauxite industry.
11. British Guiana borders Venezuela.
12. The capital of British Guiana is Port of Spain.
13. British Guiana is a land of mountains and plains.
14. Piranha are popular dishes enjoyed by residents of British Guiana.
15. An important mineral export of British Guiana is iron ore.

SELECTED STATISTICS

Continents

Continent	Area (square miles)
Asia	17,035,000
Africa	11,635,000
North America	9,435,000
South America	6,860,000
Antarctica	5,000,000
Europe	3,850,000
Australia	2,975,000

Oceans

Ocean	Area (square miles)
Pacific	64,000,000
Atlantic	31,830,000
Indian	28,350,000
Arctic	5,400,000

Largest Countries (by Area)

Country	Area (sq. mi.)
1. U.S.S.R.	8,649,821
2. Canada	3,851,809
3. China	3,641,512
4. U.S.A.	3,615,223
5. Brazil	3,287,204
6. Australia	2,974,583
7. India	1,260,000
8. Argentina	1,072,748
9. The Sudan	967,501
10. Algeria	919,593
11. The Congo	905,381
12. Greenland	840,000
13. Mexico	760,375
14. Libya	679,360
15. Iran	628,000
16. Saudi Arabia	617,700
17. Mongolia	591,121
18. Indonesia	575,894
19. Peru	496,223
20. Chad	495,754

Largest Countries (by Population)

Country	Population
1. China	725,000,000
2. India	436,425,000
3. U.S.S.R.	216,151,000
4. U.S.A.	185,235,000
5. Indonesia	95,230,000
6. Japan	94,280,000
7. Pakistan	93,690,000
8. Brazil	70,437,000
9. United Kingdom	54,096,000
10. West Germany	53,756,000
11. Italy	51,344,000
12. France	45,980,000
13. Mexico	34,923,000
14. Nigeria	34,752,000
15. Spain	30,128,000
16. Poland	29,731,000
17. Turkey	27,810,000
18. Philippines	27,473,000
19. Egypt	26,059,000
20. Republic of Korea	24,502,000

Longest Rivers of the World

River	Length (miles)	Continent
1. Nile	4,160	Africa
2. Amazon	3,900	South America
3. Mississippi-Missouri	3,860	North America
4. Yangtze	3,100	Asia
5. Congo	2,718	Africa
6. Amur	2,700	Asia
7. Hwang Ho	2,700	Asia
8. Lena	2,645	Asia
9. Mackenzie	2,635	North America
10. Mekong	2,600	Asia
11. Niger	2,600	Africa
12. Ob	2,500	Asia

Capital Cities of Major Countries Listed

Country	Capital	Country	Capital
U.S.S.R.	Moscow	Mongolia	Ulan Bator
Canada	Ottawa	Indonesia	Djakarta
China	Peking	Peru	Lima
U.S.A.	Washington	Chad	Fort-Lamy
Brazil	Brazilia	Pakistan	Rawalpindi
Australia	Canberra	West Germany	Bonn
India	Delhi	United Kingdom	London
Argentina	Buenos Aires	Italy	Rome
The Sudan	Khartoum	France	Paris
Algeria	Algiers	Nigeria	Lagos
The Congo	Leopoldville	Poland	Warsaw
Mexico	Mexico City	Turkey	Ankara
Libya	Tripoli	Philippines	Quezon City
Iran	Tehran	Egypt	Cairo
Saudi Arabia	Riyadh	Republic of Korea	Seoul
Greenland	Godthaab	Japan	Tokyo
Spain	Madrid		

Cities With Over 1,000,000 Inhabitants

1.	Tokyo	9,850,000
2.	London	8,172,000
3.	New York	7,782,000
4.	Paris	6,500,000
5.	Moscow	6,208,000
6.	Shanghai	6,200,000
7.	Buenos Aires	5,900,000
8.	Calcutta	5,600,000
9.	Bombay	4,146,000
10.	Peking	4,010,000
11.	Sao Paulo	3,825,000
12.	Chicago	3,550,000
13.	Rio de Janeiro	3,307,000
14.	Berlin	3,274,000
15.	Tientsin	3,220,000
16.	Osaka	3,085,000
17.	Leningrad	2,997,000
18.	Djakarta	2,922,000
19.	Mexico City	2,700,000
20.	Delhi	2,640,000
21.	Seoul	2,545,000
22.	Wuhan	2,500,000
23.	Cairo	2,500,000
24.	Los Angeles	2,497,000
25.	Shenyang	2,400,000
26.	Madrid	2,260,000
27.	Sydney	2,181,000
28.	*Montreal	2,110,000
29.	Karachi	2,100,000
30.	Rome	2,099,000
31.	Philadelphia	2,003,000
32.	Melbourne	1,907,000
33.	Canton	1,840,000
34.	Tehran	1,840,000
35.	*Toronto	1,824,000
36.	Budapest	1,807,000
37.	Santiago	1,739,000
38.	Madras	1,725,000
39.	Detroit	1,670,000
40.	Vienna	1,647,000
41.	Nagoya	1,643,000
42.	Chungking	1,600,000
43.	Bangkok	1,577,000
44.	Barcelona	1,558,000
45.	Harbin	1,550,000
46.	Milan	1,538,000
47.	Siam	1,500,000
48.	Taiyuan	1,500,000
49.	Vientiane	1,500,000
50.	Istanbul	1,460,000
51.	Yokohama	1,440,000
52.	Nanking	1,400,000
53.	Saigon	1,383,000
54.	Bogota	1,329,000
55.	Lahore	1,297,000
56.	Kyoto	1,295,000
57.	Bucharest	1,276,000
58.	Caracas	1,265,000
59.	Lima	1,262,000
60.	Hyderabad	1,252,000
61.	Havana	1,250,000
62.	Pusan	1,235,000
63.	Alexandria	1,200,000
64.	Dairen	1,200,000
65.	Kiev	1,174,000
66.	Ahmadabad	1,149,000
67.	Kobe	1,140,000
68.	Manila	1,132,000
69.	Chengtu	1,110,000
70.	Warsaw	1,107,000
71.	Birmingham	1,105,000
72.	Munich	1,101,000
73.	Glasgow	1,055,000
74.	Johannesburg	1,047,000
75.	Baku	1,038,000
76.	Naples	1,028,000
77.	Turin	1,028,000
78.	Brussels	1,014,000
79.	Gorkiy	1,003,000

* Indicates Metropolitan area

Mountain Peaks of the World

Mountain	Height	Mountain Range	Country
ASIA			
Mt. Everest	29,028	Himalayas	Nepal-Tibet
Mt. Godwin Austen (K2)	28,250	Karakoram	India
Kanchenjunga	28,168	Himalayas	Nepal-Sikkim
Mt. Makalu	27,790	Himalayas	Nepal-Tibet
Annapurna	26,504	Himalayas	Nepal
EUROPE			
Mt. El'brus	18,468	Caucasus	U.S.S.R.
Mont Blanc	15,781	Alps	France
Monte Rosa	15,200	Alps	Italy
Matterhorn	14,685	Alps	Switzerland
Finsteraarhorn	14,026	Alps	Switzerland
AFRICA			
Mt. Kilimanjaro	19,340		Tanganyika
Mt. Kenya	17,040		Kenya
Mt. Margherita	16,821	Ruwenzori	Uganda
Bejeda	15,158	Amhara Plateau	Ethiopia
Djebel Toubkal	13,661	Atlas	Morocco
NORTH AMERICA			
Mt. McKinley	20,320	Alaska	U.S.A.
Mt. Logan	19,850	St. Elias	Canada
Orizaba	18,696	Sierra Madre Oriental	Mexico
Mt. St. Elias	18,008	St. Elias	U.S.A.
Popocatepetl	17,887	Mexican Plateau	Mexico
SOUTH AMERICA			
Aconcagua	22,834	Andes	Argentina
Pissis	22,546	Andes	Argentina
Huascaran	22,205	Andes	Peru
Illampu	21,490	Andes	Bolivia
Chimborazo	20,577	Andes	Ecuador
AUSTRALIA AND PACIFIC ISLANDS			
Carstensz-Toppen	16,503	Nassau-Gebergte	New Guinea
Wilhelmina-Top	15,518	Nassau-Gebergte	New Guinea
Mauna Kea	13,796		Hawaii
Mt. Cook	12,349	Southern Alps	New Zealand
Kosciusko	7,316	Australian Alps	Australia
ANTARCTICA			
Mt. Kirkpatrick	14,600	Ross Barrier	
Mt. Markham	14,272	Ross Barrier	

Temperature and Precipitation Data for Selected Stations

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
Freetown, Sierra Leone — Wet Tropics													
Temperature	81	82	82	82	82	80	79	78	79	80	81	81	80.7
Rainfall	0.4	0.3	1.2	4.5	11.5	20.0	35.6	36.6	28.5	12.6	5.1	1.4	157.3
Bombay, India — Tropical Wet and Dry													
Temperature	76	76	80	83	86	84	81	81	81	82	81	77	81
Rainfall	0.1	0.1	0	0	0.7	19.9	24.0	14.5	10.6	1.9	0.4	0	72.4
Kingston, Jamaica — Tropical Wet and Dry													
Temperature	77	77	77	78	80	81	82	82	82	81	79	78	79
Rainfall	1.0	0.6	1.0	1.2	4.3	4.1	1.7	3.7	4.1	7.5	3.1	1.0	33.9
Lahore, Pakistan — Steppe													
Temperature	53	57	69	81	89	93	89	87	85	76	63	55	75
Rainfall	0.9	1.0	0.8	0.5	0.7	1.4	5.1	4.7	2.3	0.3	0.1	0.4	18.1
Kamloops, British Columbia — Steppe													
Temperature	23	26	38	50	58	64	70	68	58	48	35	28	47
Rainfall	1.0	0.8	0.3	0.4	0.9	1.2	1.1	1.1	0.8	0.6	1.0	0.9	10.1
Kano, Nigeria — Steppe													
Temperature	72	77	85	89	88	83	80	78	80	81	78	73	80
Rainfall	0.0	0.1	0.1	0.5	2.5	4.8	8.2	12.1	5.5	0.5	0.0	0.0	34.3
Karachi, Pakistan — Desert													
Temperature	65	68	75	81	85	87	84	82	82	80	74	67	78
Rainfall	0.5	0.5	0.4	0.2	0.1	0.9	2.9	1.5	0.5	0	0.1	0.1	7.6
Adelaide, Australia — Mediterranean													
Temperature	74	74	70	64	58	54	52	54	57	62	67	71	63
Rainfall	0.7	0.7	1.0	1.8	2.8	3.1	2.7	2.5	2.0	1.7	1.2	1.0	21.2

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
Gibraltar — Mediterranean													
Temperature	55	56	57	60	65	69	73	75	72	66	60	56	64
Rainfall	4.6	4.5	4.7	2.7	1.6	0.5	0	0.1	1.3	3.3	6.4	5.4	35.1
Benares, India — Humid Subtropical													
Temperature	60	65	77	87	91	89	84	83	83	78	68	60	77
Rainfall	0.7	0.6	0.4	0.2	0.6	4.8	12.1	11.6	7.1	2.1	0.2	0.2	64.3
Vancouver, British Columbia — Marine West Coast													
Temperature	36	38	42	47	54	59	63	62	56	49	43	48	48
Rainfall	86	6.1	5.3	3.3	3.0	2.7	1.3	1.7	4.1	5.9	10.0	7.8	59.8
Dunedin, New Zealand — Marine West Coast													
Temperature	58	58	55	52	47	44	42	44	48	51	53	56	51
Rainfall	3.4	2.7	3.0	2.7	3.2	3.2	3.0	3.1	2.8	3.0	3.3	3.5	36.9
London, England — Marine West Coast													
Temperature	39	41	43	47	55	60	63	62	58	51	44	41	51
Rainfall	1.9	1.6	1.6	1.6	1.8	2.0	2.2	2.2	2.0	2.6	2.3	2.3	23.9
Calgary, Alberta — Humid Continental													
Temperature	13	15	25	40	49	56	61	59	51	42	28	19	38
Rainfall	0.5	0.6	0.7	0.8	2.3	2.9	2.6	2.5	1.3	0.7	0.7	0.5	16.1
Dawson, Yukon — Subarctic													
Temperature	—23	—11	4	29	46	57	59	54	42	25	1	—13	23
Rainfall	0.8	0.8	0.5	0.7	0.9	1.3	1.6	1.6	1.7	1.3	1.3	1.1	13.6
Leh, Kashmir — Highland													
Temperature	17	19	31	43	50	58	63	61	54	43	32	22	41
Rainfall	0.4	0.3	0.3	0.2	0.2	0.2	0.5	0.5	0.3	0.1	0.0	0.2	3.2

Leading Canadian Imports and Exports

Imports	Rank in:	1961	1960	1959	1958
Machinery		1	1	1	1
Automobile Parts		2	2	2	3
Petroleum		3	3	3	2
Electrical Apparatus		4	4	4	4
Aircraft and Parts		5	9	10	9
Engines and Boilers		6	6	7	7
Automobiles		7	5	5	6
Tractors and Parts		8	8	6	8
Iron and Steel Products		9	7	8	5
Farm Implements		10	10	9	10

Exports	Rank in:	1961	1960	1959	1958
Newsprint		1	1	1	1
Wheat		2	2	2	2
Lumber and Timber		3	3	3	3
Wood Pulp		4	4	5	4
Nickel		5	7	7	7
Aluminum		6	5	6	6
Copper		7	8	8	8
Uranium		8	6	4	5
Petroleum		9	10	10	10
Iron Ore		10	9	9	9

Per Capita Income* — Selected Countries (1960)

1.	U.S.A.	2305
2.	Canada	1580
3.	Sweden	1465
4.	Australia	1430
5.	United Kingdom	1180
6.	West Germany	1014
7.	France	964
8.	U.S.S.R.	761
9.	Italy	499
10.	Japan	330

* (in Canadian dollars)

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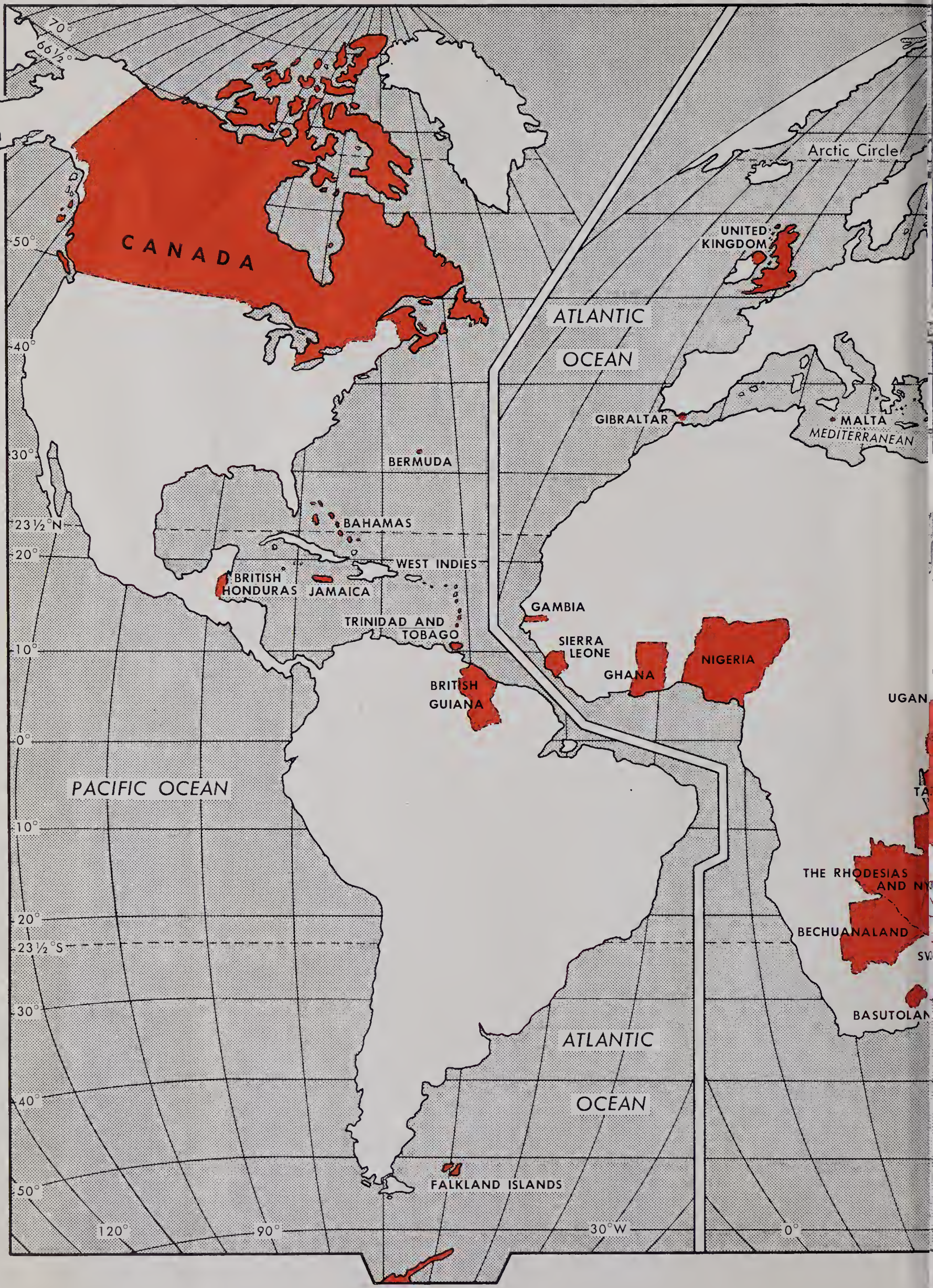
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66½°
Arctic Circle
CANADA
UNITED KINGDOM
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ATLANTIC
OCEAN
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GIBRALTAR
MALTA
MEDITERRANEAN
30°
BERMUDA
BAHAMAS
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20°
WEST INDIES
BRITISH HONDURAS
JAMAICA
GAMBIA
TRINIDAD AND TOBAGO
SIERRA LEONE
10°
GHANA
NIGERIA
BRITISH GUIANA
UGAN
0°
PACIFIC OCEAN
TA
10°
THE RHODESIAS AND NY
20°
BECHUANALAND
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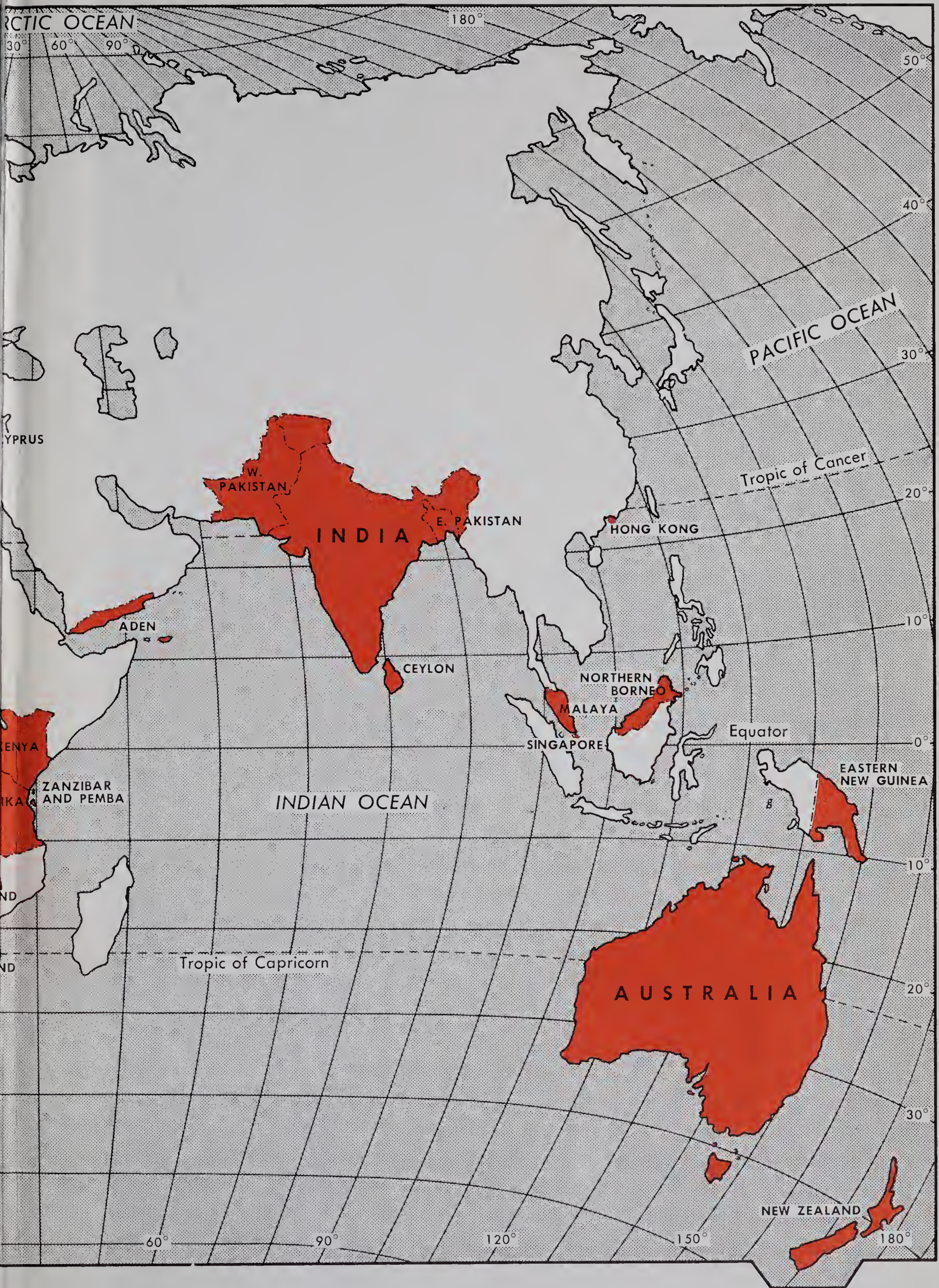
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30°
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90°
180°
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40°
PACIFIC OCEAN
30°
YPRUS
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INDIA
E. PAKISTAN
Tropic of Cancer
20°
HONG KONG
ADEN
10°
CEYLON
NORTHERN BORNEO
MALAYA
SINGAPORE
Equator
0°
ENYA
ZANZIBAR AND PEMBA
KA
INDIAN OCEAN
EASTERN NEW GUINEA
10°
ND
Tropic of Capricorn
ND
AUSTRALIA
20°
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NEW ZEALAND
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120°
150°
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